NORMAN A. JOHNSON
Editor

CHARLES A. WHITEHEAD
Managing Editor

MYRON D. REESER
Business Manager

HERBERT A. STAUDERMAN
Advertising Manager

WILLIAM J. O'CONNOR
Production Manager

BERYL A. LAKNER
Circulation Manager

OFFICIAL PUBLICATION OF THE PROCEEDINGS, AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

American Dyestuff Reporter was founded in 1917 and the Textile Colorist and Converter (formerly Textile Colorist) was incorporated with it in January, 1949. Published every other Monday, by the **HOWES PUBLISHING COMPANY, INC.**, 44 East 23rd Street, New York 10, N. Y. **C. R. Howes**, President; **Ernest J. Finan**, Executive Vice-President; **Norman A. Johnson**, Vice-President & Treasurer; **Myron D. Reeser**, Vice-President; **Clara Patrick**, Secretary.

Telephone SPring 7-9364

AMERICAN
DYESTUFF REPORTER
DEVOTED TO TEXTILE WET-PROCESSING

contents

VOLUME 48 JUNE 29, 1959 NUMBER 13

special article

Tetrahydropyrimidinone Derivatives for Non-chlorine-retentive, Wrinkle-resistant Cotton Fabrics 23
J G Frick Jr, Bethlehem A Kottes, and J David Reid

aatcc proceedings

featured articles

Mechanisms Influencing the Wash and Wear Characteristics of Cellulosic Fabrics 27
Charles R Williams
Synthetic and Natural Fiber and Yarn Processing Aids 31
Charles H Lighthipe and Ralph G Shaubhut
Fluorochemicals: The New Idea in Textiles 37
Edwin J Grajeck and William H Petersen
Probability of a California Textile Mill 40
A C Hall

miscellaneous

Nominations for Harold C Chapin Award 36
Future Papers to Appear in the *Proceedings* .. 36
Employment Register 41
Sights to be Seen at the Convention City 42
Elected to Membership 44
Membership Applications 45
AATCC Calendar 45
Activities of the Local Sections 45

departments

General Calendar 25
Abstracts 26
Inter Alia—Inter Nos 47
P J Wood
Patent Digest 49
Paul Wengraf
News of the Trade 51
Names in the News 54
New Products and Developments 55

Copyright, 1959, Howes Publishing Co, Inc
Contents of previous issues can be found by consulting the Industrial Arts Index and the Engineering Index, Inc, at your library

TO SOLVE YOUR FINISHING PROBLEMS YOU NEED BOTH...

TOP-QUALITY PRODUCTS

TOP-QUALITY SERVICE

The *successful* solution of a finishing problem always calls for two things: 1) Expert technical analysis; and 2) Products which meet the specific need with scientific precision. You get both from the Textile Finishes Department of Procter & Gamble. P&G offers you unsurpassed experience in solving finishing problems that require fatty based finishes and softeners, and in developing and manufacturing the needed soaps and detergents.

If you are interested in eliminating finishing difficulties and improving your processing and results, be sure to have the Procter & Gamble Textile Finishes experts evaluate your situation—without cost or obligation on your part. The data you receive will be based on *your* fabrics, *your* finishing procedures . . . and whatever other special materials or conditions are involved in *your* problems. And this expert analysis will be backed up by a specialized product or products selected from the many developed in the famous P&G laboratories.

For all the facts call the P&G Textile Representative nearest you. Or, if you prefer, write to Textile Finishes Section, Procter & Gamble, Industrial Specialty Sales Department, Cincinnati 1, Ohio.

New! PROXOFT-N

A remarkable new type of nonionic softener and lubricant. PROXOFT-N was developed by Procter & Gamble especially to give maximum stability with acids, salts and other trouble-making chemicals. It has the compatibility of the best nonionic agents and, at the same time, gives the desired lubricity and smooth, full-bodied softness which is characteristic of anionics. PROXOFT-N can be used advantageously on all types of natural and synthetic fibers.

PROCTER & GAMBLE

The **PROCTER & GAMBLE** Company • **TEXTILE FINISHES** Dept., Cincinnati 1, Ohio

BRANCH OFFICES: Atlanta • Baltimore • Boston • Brooklyn • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Detroit • Hartford • Kansas City • Los Angeles Louisville • Memphis • Milwaukee • Minneapolis • New Orleans • New York City • Omaha • Philadelphia • St. Louis • San Francisco • Summit (N. J.) • Syracuse

AMERICAN
DYESTUFF REPORTER
Volume 48 June 29, 1959 Number 13

TETRAHYDROPYRIMIDINONE DERIVATIVES FOR NON-CHLORINE RETENTIVE, WRINKLE-RESISTANT COTTON FABRICS

J G FRICK JR, BETHLEHEM A KOTTES, and J DAVID REID
Southern Regional Research Laboratory[1]
New Orleans, La

A new wrinkle-resistant and "wash-and-wear" finish for cotton fabrics has been developed using the dimethylol derivative of tetrahydro-5-hydroxy-2(1H)-pyrimidinone as the finishing agent. The finish is comparable to other wrinkle-resistant finishes in current use but causes no chlorine damage even after repeated hot launderings.

INTRODUCTION

IN RECENT YEARS, the finishing of cotton fabrics to give them wrinkle-resistant and "wash-and-wear" properties has become a widespread and common practice. The large demand for cotton fabrics so finished and the general use of hypochlorite bleaches in this country has made the problem of damage from chlorine retained by these finishes a major one. To alleviate this problem, the cyclic urea type of finishing agent was developed and is finding increasing use in industry.

The first of the cyclic ureas to find wide acceptance was the dimethylol derivative of ethyleneurea, 2-imidazolidinone (Figure 1). In theory, this finishing agent should not retain chlorine because, when completely reacted, the nitrogens are fully substituted and no amido hydrogens remain to allow chloramide formation. In practice, however, it was found that the finish obtained from this agent did retain chlorine after the finished fabric was submitted to several hot alkaline launderings, although the initial chlorine retention was low as expected. It has been concluded from previous work *(1)* that the loss of chlorine resistance is due to hydrolytic cleavage of the imidazolidinone ring on laundering.

Another type of cyclic urea finishing agent is the more recently described "triazones" *(2, 3)*. These agents are the methylol derivatives of 5-substituted perhydrotriazinones, such as dimethylol ethyltriazone, or 1, 3-bis(hydroxymethyl) tetrahydro-5-ethyl-s-triazin-2(1H)-one (Figure 2). In this class of compounds, the presence of an alkaline amino group prevents acid damage from any chlorine that may be retained. Fabrics finished with triazones, however, have a tendency to discolor on overheating, may be malodorous unless thoroughly washed after finishing, and lose more of their wrinkle resistance on laundering than fabrics with most other finishes.

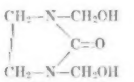


Figure 1
1,3-Bis(hydroxymethyl) 2-imidazolidinone (DMEU)

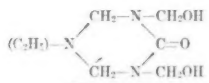


Figure 2
1,3-Bis (hydroxymethyl) tetrahydro-5-ethyl-s-triazin-2(1H)-one (DMET)

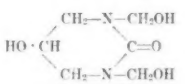


Figure 3
1,3-Bis(hydroxymethyl)-tetrahydro-5-hydroxy-2(1H)-pyrimidinone (DMHP)

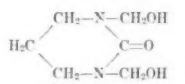


Figure 4
1,3-Bis(hydroxymethyl)-tetrahydro-2(1H)-pyrimidinone

The present article describes the use of another finishing agent of the cyclic urea type, namely the dimethylol derivative of tetrahydro-5-hydroxy-2(1H)-pyrimidinone (Figure 3). The relationship of this compound to dimethylol ethyleneurea is apparent; it is a substituted cyclic trimethyleneurea. This agent produces a finish on cotton fabric to give textile properties quite similar to those obtained with the ethyleneurea derivative. The finish, however, does not lose its chlorine resistance on repeated laundering. The increased stability of the finish is apparently due to the greater resistance of the six-membered ring to hydrolytic cleavage as compared to that of the five-membered ring.

The durability of the pyrimidinone finish under acidic conditions is no less than that of the ethyleneurea finish. Removal of the latter finish has been reported to occur when excessively acidic or otherwise overly vigorous conditions are used in the souring step of a commercial laundry procedure *(4)*. Even less drastic, acidic conditions will reduce the chlorine resistance of the ethyleneurea finish *(3)*. In this respect the pyrimidinone finish shows an advantage, as the susceptibility to increased chlorine retention of the pyrimidinone finish under such conditions is less.

The hydroxy-substituted compound was chosen merely because the 1, 3-diamino-2-propanol from which it is prepared was the most readily available of the trimethylenediamines. A small amount of the unsubstituted compound, 1,3-bis(hydroxymethyl) tetrahydro-2(1H)-pyrimidinone (Figure 4), was prepared and used for comparative purposes.

[1] One of the laboratories of the Southern Utilization Research and Development Division, Agricultural Research Service, US Department of Agriculture.

TABLE I
Properties of cotton print cloth finished with DMHP

	Add-on %	Wrinkle recovery angle, degrees			Tearing strength grams		Breaking strength, lbs w	Abrasion resistance cycles	Moisture regain %
		w	f	w + f	w	f			
DMHP treated	4.9	143	146	289	600	360	31.2	175	5.5
DMHP and polyethylene treated	6.3	152	149	301	653	373	—	168	—
Untreated fabric	—	86	93	179	1060	667	48.0	629	6.4
Untreated and washed fabric	—	93	93	186	960	687	49.0	519	6.6

Since this work was completed, the latter compound has been offered as a textile finishing agent in experimental quantities *(5)*.

MATERIALS AND METHODS

Tetrahydro-5-hydroxy-2(1H)-pyrimidinone was prepared by a method similar to that described for the preparation of ethyleneurea *(6)*. Urea, 60 g (1 mole), 90 g (1 mole) 1,3-diamino-2-propanol were combined in 70 g ethylene glycol and refluxed 4.5 hours. The temperature of the mixture rose to 185°C during this period. On cooling, the mixture solidified. The solid residue was recrystallized from 80% ethanol to give 68 g of tetrahydro-5-hydroxy-2-(1H)-pyrimidinone, mp 208-210°C. Melting point reported in literature *(7)* is 210-211°C. Nitrogen content: found 23.9%, theoretical 24.3%.

The dimethylol derivative of tetrahydro-5-hydroxy-2(1H)-pyrimidinone (DMHP) was prepared by dissolving the product prepared above in an amount of formalin, adjusted to pH 7-8 with sodium hydroxide, that contained two molar equivalents of formaldehyde and sufficient water to make a 33⅓% solution of the dimethylol compound. This solution was allowed to stand overnight before use. No attempt was made to isolate the pure dimethylol compound.

For application to fabric, the above 33⅓% solution of DMHP was diluted to 7.5%. Zinc nitrate hexahydrate and acetic acid were added as catalysts in amounts to make 0.5% and 0.05% of the solution respectively. Where noted that polyethylene was used, the treating bath included 5% of a polyethylene emulsion containing 30% solid polyethylene (Polymul CS-81 of Nopco Chemical Company[2]).

Treating solutions of dimethylol ethyleneurea, DMEU, and dimethylol ethyltriazone, DMET, were prepared as described previously *(1, 3)*. These solutions were used to treat fabric for comparison with that treated with DMHP. The same catalyst was used with all three finishing agents.

[2] Throughout this paper, the mention of trade names and firms does not imply their endorsement by the Department of Agriculture over other similar products or firms not mentioned.

The fabric used in this investigation was an 80 x 80 white, cotton print cloth 3.2 oz/sq yd, which had been desized, given an open caustic boil, and bleached. The finishing agent was applied by padding the fabric with the treating solution, using two dips and two nips, to 70-80% wet add-on. Drying and curing were performed on pin-frames in an oven with circulating hot air. For the DMHP finish, the fabric was dried at 60°C for seven minutes and cured at 150°C for three minutes. The other finishes were dried and cured as described in the references *(1, 3)*. All samples were after-washed with a nonionic detergent in slightly alkaline solution and tumble-dried before testing.

Fabrics were tested by the following methods: tearing strength, Elmendorf method, ASTM *(8)* designation D1424-56T; wrinkle recovery angle, Monsanto method, ASTM designation D1295-53T; moisture regain, ASTM designation D629-57T; breaking strength, ASTM designation D39-49, on strips raveled to 80 threads; flex abrasion by the Stoll method, ASTM designation D1175-55T; damage caused by retained chlorine (scorch test), AATCC tentative test method 69-1952 *(9a)*.

Two types of laundering procedures were used to test the durability of the finish. A home-type laundering was performed in an agitator-type, home automatic washer with a household detergent, using no bleach, and was followed by drying in a tumble dryer. The other type of laundering procedure was the more vigorous one described in AATCC test method 14-53 *(9b)*.

RESULTS AND DISCUSSION

In Table I are shown the properties of cotton print cloth treated with 1,3-bis(hydroxymethyl) tetrahydro-5-hydroxy-2 (1H)-pyrimidinone, DMHP, with and without a polyethylene additive, and the properties of the untreated fabric for comparison. Good wrinkle recovery is obtained and other fabric properties are comparable to those obtained with other wrinkle-resistant finishing agents *(3)*. The addition of polyethylene to the finishing agent gives not only the improvements in properties shown in Table I, but also marked improvement in the appearance of the samples after laundering. This combination of DMHP and polyethylene produces a very good "wash-and-wear" finish to the cotton fabric.

The durability of the DMHP finish is demonstrated by the results shown in Table II. Although some loss in wrinkle recovery occurs, the values are still quite high. The loss in tearing strength on laundering is comparable to that occurring with the untreated fabric. No loss in tearing strength occurs on laundering when polyethylene is added to the finish.

The most marked advantage of the DMHP finish over the other cyclic urea finishes is its resistance to chlorine damage after repeated launderings. This is shown in Table III by the results obtained in the scorch test with DMHP, DMEU (ethyleneurea) and DMET (ethyltriazone) after laundering and exposure to hydrolytic conditions. A greater proportion of the breaking strength is retained after washing and alkaline hydrolysis with DMHP than with either DMEU or DMET. Furthermore the yellowing observed on scorching fabric treated with DMET did not occur with DMHP. After acidic hydrolysis, DMHP shows some advantage over

TABLE II
Durability of the DMHP finish

	Wrinkle-recovery angle degrees, w+f			Tearing strength, g, w+f		
	Original	After 15 home-type launderings	After five AATCC 14-53 launderings	Original	After 15 home-type launderings	After five AATCC 14-53 launderings
DMHP treated	289	276	275	960	847	933
DMHP and polyethylene treated	301	278	285	1026	1060	1180
Untreated fabric	179	158	155	1727	1513	1646

TABLE III
Damage caused by chlorine retained by finishes

Finishing Agent	Original fabric	Breaking strength retained after scorch test, AATCC 69-1952, % of original: After 15 home-type launderings	After five AATCC 14-53 launderings	After alkaline hydrolysis[1]	After acidic hydrolysis[2]
DMHP	93	90	99	98	81
DMEU	108	93	50	68	70
DMET	95	82	94	81	89
Untreated fabric	96	80	102	—	—

[1] 1% Na_2CO_3 (pH 11.0) at 80° C for one hour.
[2] Buffer solution (pH 3.4) at 40° C for 30 minutes.

TABLE IV
Loss of wrinkle recovery on hydrolysis

pH of hydrolysis	Wrinkle recovery after hydrolysis[1], degrees, w + f: DMHP treated	DMEU treated
14.0	279	279
11.0	283	275
6.5	290	283
4.4	271	270
3.4	210	262
2.4	204	204

[1] Hydrolysis at 40° C for 30 minutes at indicated pH.

DMEU but less than occurs after alkaline treatment. In comparison with DMET after acidic hydrolysis, DMHP causes greater strength loss but again shows an advantage in less discoloration.

Inasmuch as the tetrahydropyrimidinone structure of DMHP has no basic groups to neutralize any retained chlorine, the greater chlorine resistance of this compound as compared with DMEU is apparently due to greater resistance of the ring to hydrolytic cleavage. That the increased stability is due to the six-membered ring and not to the hydroxyl substituent is shown by the similar behavior of the unsubstituted compound, 1,3-bis(hydroxymethyl) tetrahydro-2(1H)-pyrimidinone. The tetrahydro-2(1H)-pyrimidinone, mp 257-260°C, was prepared and applied to fabric in the same manner as tetrahydro-5-hydroxy-2(1H)-pyrimidinone. Breaking strength retained in the scorch test was 104% of original on the treated fabric before and 102% after five AATCC launderings.

Although the DMHP finish shows greater resistance to hydrolytic conditions than DMEU with respect to chlorine resistance, the wrinkle resistance can be removed as easily by acidic hydrolysis. This is shown by the data in Table IV where the wrinkle recoveries after hydrolytic treatments are given. Because of this property, it may be expected that the tetrahydro-pyrimidinone finish will be as susceptible as the ethyleneurea finish to removal by the excessively strenuous souring conditions sometimes encountered in laundering.

Water solutions of DMHP can be stored for at least three months before use. Fabric treated with DMHP, which had been stored as the 33⅓% solution for this length of time, showed the same high wrinkle recovery angles and "wash-and-wear" properties as that treated with a freshly prepared solution.

SUMMARY

A wrinkle-resistant and "wash-and-wear" finish for cotton fabrics based on the dimethylol derivative of tetrahydro-5-hydroxy-2(1H)-pyrimidinone has been developed which shows several advantages over currently used finishes. The finishing agent is structurally similar to dimethylol ethyleneurea and produces a finish with similar properties. It causes no chlorine retention, however, and this property is retained after repeated hot, alkaline launderings. Also, it does not yellow on heating as the triazone finishes often do and leaves no residual odor. It is, however, susceptible to hydrolytic removal by acidic conditions below pH 4, which renders it vulnerable to overly acidic or hot souring conditions. Although in this vulnerability it is similar to finishes produced from dimethylol ethyleneurea, the pyrimidinone finish loses less chlorine resistance than the ethyleneurea finish under acidic conditions, prior to complete removal.

ACKNOWLEDGMENT

The authors wish to express their thanks to members of the Product Evaluation group of this Division, and in particular to Margarette Loughlin and Julia M Sloan for the textile testing; and to Julian F Jurgens for the nirogen analysis.

LITERATURE CITED

(1) Frick, Jr, J G; Kottes, Bethlehem A; and Reid, J. D; *Textile Research J* **29**, 314 (1959)
(2) Wayland, Jr, R L, *ibid* **29**, 170 (1959)
(3) Reid, J D; Frick, Jr, J G; Reinhardt, R M; and Arceneaux, R L; *Am Dyestuff Reptr* **48**, No. 3, P81-P90 (Feb 9, 1959).
(4) Mazzeno, Jr, L W; Kullman, R M H; Reinhardt, R M; and Reid, J D; *ibid* **47**, 609 (1958).
(5) Goodman, Jr, H G, "1,3-Dimethylol Hexahydropyrimidinone-2 as a Potential Crease-Resistant Agent for Textiles," Tech Service Report, Union Carbide Chemicals Co, Pittsburgh, Pa (1958).
(6) Wayland, Jr, R L, (to Dan River Mills, Inc), U S Patent 2,825,732 (1958).
(7) McKay, A F; Coleman, J R; and Grant, G A; *J Am Chem Soc* **72**, 3205 (1950).
(8) American Society for Testing Materials, "ASTM Standards on Textile Materials," Philadelphia, Pa (1955).
(9) American Association of Textile Chemists and Colorists, Technical Manual, Howes Publishing Co, Inc, New York, N Y (1957); (a) p121; (b) p123.

General Calendar

AMERICAN OIL CHEMISTS SOCIETY
Sept 28-30 (Statler Hotel, Los Angeles, Calif)

AMERICAN TEXTILE MACHINERY ASSOCIATION
May 23-27, 1960 (American Textile Machinery Exhibition, Auditorium, Atlantic City, NJ)

ASSOCIAZIONE COSTRUTTORI ITALIANI DI MACCHINARIO PER L'INDUSTRIA TESSILE
September 12-21 (3rd International Textile Machinery Exhibition, Milan Fair, Milan, Italy)

DRUG, CHEMICAL AND ALLIED TRADES SECTION, NY BOARD OF TRADE
Sept 17-20 (69th Annual Meeting, Sagamore Hotel, Bolton Landing, Lake George, NY)

GORDON RESEARCH CONFERENCE ON TEXTILES
July 13-17 (Colby Jr College, New London, NH)

NATIONAL COTTON COUNCIL
Oct 7 (Chemical Finishing Conference, Mayflower Hotel, Washington, DC)

SYNTHETIC ORGANIC CHEMICAL MANUFACTURERS ASSOCIATION OF THE UNITED STATES
Sept 15, Oct 13, Nov 4 (Luncheon meetings at the Hotel Roosevelt, New York, NY); Dec 2 (Annual meeting and dinner—Hotel Roosevelt, New York, NY)

TEXTILE RESEARCH INSTITUTE
March 24-25, 1960 (30th Annual Meeting, Hotel Commodore, New York, NY)

Abstracts

Unpleasant Odors from Crease-resist Finishing

Marsh, J T, *Textile Recorder* 76, 85-6, Dec, 1958

A minor but inherent weakness of the crease-resist process is the production of a fishy smell in the finished articles. Fundamentally this odor is caused by faulty processing and is due primarily to the formation of methyl-, dimethyl- and trimethylamines.

Fishy odors are rarely encountered in cloths in the finishing works themselves, for the methylamines are not actually produced as free bases in the reaction but as salts which hydrolyze in a warm and moist atmosphere, which may be encountered in a warehouse or storeroom, or which may result from perspiration from the body of a person wearing a garment made from the fabric; the amine salt is readily decomposed by alkalis.

In the crease-resist process, the methylamines can be formed by an excess of formaldehyde, excessive curing, inadequate acidity during the final condensation of the resin, or an excess of ammonium salt catalyst.

To prevent the production of the fishy odor, the addition of dicyandiamide or urea to the resin bath has been recommended, as it reacts quickly with any free formaldehyde. Catalysts which do not contain ammonia are an improvement. It is recommended that the crease-resisting process be carried out in the most efficient manner, and that a final thorough wash be not omitted.

The author points out that, although some finishers appear to think the main object of the final wash is to neutralize the catalyst, actually neutralization alone may be very bad practice, which merely liberates trimethylamine without removing it.

Tests for the presence of methylamines in a fabric are described. A solution of iodine in potassium iodide gives a red precipitate with methylamine, yellow with dimethylamine, and brown with trimethylamine. A simple and "quite adequate" test is to moisten the fabric with sodium carbonate, warm, and smell it.

The author also discusses the use of other resins in place of urea, eg, dimethyl cyclic ethylene urea and the so-called triazones.

Acrylonitrile in the Textile Industry

MacGregor, J H, *J Soc Dyers Col* 75, 181-8, April, 1959

Acrylonitrile today is by far the most important individual nitrile, and according to the author is undoubtedly one of the most versatile organic chemicals which have become available commercially in the last quarter-century. Besides its importance in the high-polymer field, where it is not only a component of one of the most useful synthetic rubbers but also the main constituent of a wide and ever-growing range of commercially available synthetic fibers, known collectively as the "acrylics", acrylonitrile is also capable of interacting with a large number of organic substances containing reactive hydrogen atoms.

Two methods of manufacturing acrylonitrile are described, one based on the dehydration of ethylene cyanohydrin, the other on the addition of hydrogen cyanide to acetylene.

All organic compounds containing reactive hydrogen atoms (eg, alcohols, water, amines) react readily with acrylonitrile in the presence of a base. This reaction is known as cyanoethylation.

When cellulose is treated with acrylonitrile under appropriate conditions, a part or all of cellulose's hydroxy groups can be cyanoethylated.

The reaction of acrylonitrile with viscose in the proper molar ratio yields ethers soluble in dilute caustic soda and capable of being spun into filaments which may be used as scaffolding threads in cotton fabrics. Water-soluble ethers may also be obtained; these are very good emulsifying agents.

Acetone-soluble cyanoethylcelluloses, made by reacting cyanoethylated cellulose with excess acrylonitrile, may be dry-spun into filament yarns extremely resistant to photodegradation.

Water-soluble cyanoethyl starches possess good emulsifying and dispersing properties, and are satisfactory sizing materials for viscose rayon staple warps. The water-soluble cyanoethyl ethers of polyvinyl alcohol are also useful for sizing.

The cyanoethylation of cotton yarn, which has been the object of intensive research in the U S, is described at some length. A partially cyanoethylated cotton fiber, known commercially as "Azoton", has several unusual properties including rot and mildew resistance, stability to degradation by wet and dry heat, and modified dyeing properties.

Wool may be cyanoethylated without degradation and has increased affinity for cationic and direct dyes, according to the author.

The remainder of the paper is taken up by a discussion of the production of textile fibers from polyacrylonitrile and its copolymers. Owing to the poor dyeing properties of 100% polyacrylonitrile, it is customary to copolymerize acrylonitrile with vinyl derivatives (eg, vinyl pyridine) having a more polar character.

The properties of the acrylic fibers are described, also the production of high-bulk yarns and of blends with other fibers which combine warmth with lightness and good wearing properties. Finally, a reference is made to the processing and dyeing of these yarns.

Thirteen references to the literature are cited.

Phosphonomethylation of Cotton

Drake, Jr, G L, Reeves, W A and Guthrie, J D, *Textile Research J* 29, 270-5, March, 1959

The use of several phosphorus-containing chemicals to introduce new physical and chemical properties into cellulose through chemical modification has been previously reported in the literature.

A new phosphorus-containing ether of cotton cellulose has been made by reacting cotton with disodium chloromethylphosphonate in the presence of sodium hydroxide. The preparation of the reacting solution is described. Fabric is treated by padding with this solution and then heating.

The degree of substitution can be varied widely by varying the concentration of the phosphonomethylating agent and of the sodium hydroxide, and by varying the time (5-30 minutes) and temperature (110-140°C) of the cure.

Up to 2.25% phosphorus was introduced into the cotton by a single treatment with the solution. Generally, the modified cotton becomes water soluble when about 2.0% phosphorus is introduced. Fabric containing up to 3.96% phosphorus was produced by giving it a double treatment. At this degree of substitution the textile was quite soluble in water.

A permanently starched effect is produced with phosphorus content of approximately 1%. At this degree of substitution there is little or no change in the breaking strength of the fabric. Modified cotton containing between 1% and 2% phosphorus has greatly increased swelling properties in water.

The phosphonomethyl cotton is produced as the sodium salt. It can be converted to the free acid form by soaking or rinsing in dilute mineral acid. When in the ammonium salt form it has good flame resistance.

Thirteen references to the literature are cited.

Proceedings of the

American Association of Textile Chemists and Colorists

Copyright, 1959, American Association of Textile Chemists and Colorists

June 29, 1959

Hudson-Mohawk Section———

MECHANISMS INFLUENCING THE WASH AND WEAR CHARACTERISTICS OF CELLULOSIC FABRICS*

CHARLES R WILLIAMS

Monsanto Chemical Co

Springfield 2, Mass

A study of both cotton and rayon fabrics treated to provide a wide range of properties is presented, with the object of delineating mechanisms and physical properties influencing the "wash and wear" characteristic of fabric. Two distinctly different mechanisms of fabric distortion are observed, and attributed to distortional forces: 1) internal to the fabric and 2) external to the fabric.

Achievement of dimensional stability prevents the development of internal forces, and high wrinkle recovery minimizes external distortions. Good W & W appearance after laundering requires both dimensional stability and high wet wrinkle recovery, but is probably not dependent on high dry wrinkle recovery. All three physical properties are required for good wash *and* wear performance.

INTRODUCTION

THE "Wash and Wear" (W & W) development, which in its infancy stormed the textile industry, is showing definite signs of maturity. It now has well-developed evaluation techniques *(1)*, and has established certain quantitative levels of performance. Its consumers understand it better, and are beginning to exercise more discretion than wild enthusiasm.

From a technical viewpoint, this first stage of maturity is also evident. The practical evaluation of proprietary products is substantially complete. The W & W performance of the available fibers, fabrics, and finishes is largely known. In addition, their inherent relative advantages and disadvantages have been catalogued, so that there is sufficient technology to support the intelligent selection of the best W & W fabrics available for any application.

The further improvement of W & W, in what we might call its adolescent stage, will now depend largely upon the specific development, for W & W, of new and improved fibers, fabrics, and finishes. This will require a better knowledge of the principles and mechanisms which govern and influence W & W than now presently exists.

It is, therefore, the primary object of this paper to discuss these principles in the light of past knowledge, and through experiment, clearly delineate those properties which have a major influence on W & W, and still further, indicate their relative importance. The experimental approach is based on cellulosic fabrics, as the broad property modifications easily made with cellulose allow investigation of several mechanisms difficult or impossible to evaluate with synthetics. The nature of the conclusions derived is such, however, that they should be applicable in principle to all W & W fabrics, cellulosic or synthetic.

PRESENT TECHNOLOGY——— It is well established that there are two major influences on the W & W characteristics of fabrics: 1) psychological, including the masking of physical configurations by pattern, color, contrast, and surface modifications, and the aesthetic influences of preferred colors and designs; and 2) physical, encompassing everything which influences the mechanical performance of the fabric, particularly fiber type, fabric construction, physical properties, and mechanical and finishing treatments.

PSYCHOLOGICAL EFFECTS ———It is perhaps best to discuss first the psychological effects. These are largely outside conscious or effective control for W & W purposes, being the result of properties imparted to fabric for reasons entirely apart from a desire to influence W & W. The printing, dyeing, or surface modification (flocking, embossing) of fabric is done primarily to please the consumer aesthetically. It is governed by the influences of styling, of eye-pleasing designs, colors, and contrasts. Fabrics would still be dyed or printed or embossed in accordance with the demands of style and fashion, even if the extremely complex influences of color and pattern on W & W were characterized.

These psychological effects are always positive; that is, they improve W & W performance over and above that level influenced by physical properties alone. However, they are generally small in magnitude, and in relation to physical effects. The W & W performance of the most effective prints, as compared with white fabric, is seldom more than one category better, as judged by the AATCC test *(2)*.

Essentially, this means that the most important area for effective influence of W & W is that of the physical factors. A more complete understanding of these factors can yield rich rewards in the development of better W & W fabrics.

PHYSICAL EFFECTS———The most quantitative definitions of W & W physical property relationships have dealt particularly with the dry wrinkle recovery of cotton as modified by treatment with thermosetting cellulose crosslinking materials *(3, 4, 5)*. These studies have shown that there is a direct linear correlation between dry wrinkle recovery and W & W, for cotton treated with any of the resins or reactant

* Presented before the Hudson-Mohawk Section on April 3, 1959.

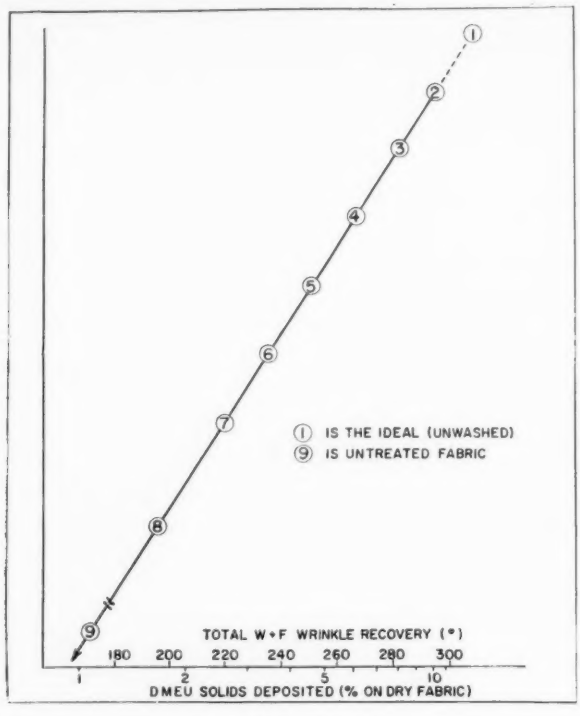

① IS THE IDEAL (UNWASHED)
⑨ IS UNTREATED FABRIC
TOTAL W+F WRINKLE RECOVERY (°)
180 200 220 240 260 280 300
1 2 5 10
DMEU SOLIDS DEPOSITED (% ON DRY FABRIC)

Figure 1
The wash and wear standard series

materials typified by methylolated melamines, ureas, or cyclic ureas. It has also been shown that, under these conditions, dry and wet wrinkle recovery are proportional to each other *(3)*. No data is given to establish which, if either, of these two properties has the predominant influence on W & W.

As these studies were concerned with the practical utilization of the established correlations for the evaluation and development of W & W finishes and fabrics, and also as a basis for W & W test development, further investigation of underlying mechanisms was not presented.

It is vital, however, to the development of W & W fabrics based on rayon and the hydrophobic synthetics, and cotton treatments outside the general class studied, that wet and dry wrinkle recovery and other important properties be separated, identified, and classified as to their relative importance to W & W.

EXPERIMENTAL

COTTON———As a first step in this direction, let us examine the configurations after washing of a series of fabrics which conform to this dry wrinkle recovery, wet wrinkle recovery, W & W proportionality over the practical range of these properties. Figure 1 presents graphically the wrinkle recovery (dry), W & W, resin solids relationship of a series of fabrics previously described in the literature *(5)*.

In this series (Figure 2), psychological effects have been eliminated by the use of white, pure-finish cotton fabric. Equal increments of dry wrinkle recovery and W & W have been obtained between consecutive samples, by application of logarithmic increments of resin *(6)*. The proportionality of the measured properties with wet wrinkle recovery is insured by the use of conditions (resin and fabric) where this proportionality is known to exist *(3)*.

Fabric 1 represents ideal appearance—it actually has not been washed. It provides a standard for comparison under the severe lighting conditions used to photograph these fabrics. Fabric 2 shows the incidence of some rippling—there are no wrinkles or creases, just a few smooth bumps best defined as ripples. Fabric 3 shows more rippling, and if one looks closely, a very few slight creases may be detected. In fabric 4, the ripples are more numerous and have sharper peaks. Creasing is becoming evident. Fabric 5 shows the slightest beginning of wrinkling, where creases are now intersecting, and presents intense rippling. Fabric 6, which was prepared with 3.4% resin solids, presents a dramatically different appearance, which is obviously not a progression of the ripples and creases observed in the higher samples. Here, wrinkling, which hardly appears in 5, is prevalent, with a myriad of small, sharp, intersecting creases. At the same time, the large ripples have disappeared, apparently because the intense wrinkling restricts their formation. Fabric 7 shows a further increase in intensity and sharpness of wrinkles. Fabric 8 is still worse in this respect, and puckering shows as a result of significant shrinkage. Fabric 9 (not resin-treated), shows marked shrinkage, and considerable puckering, which is all but obscured by the intensity and sharpness of the wrinkling.

There is one obvious conclusion to be drawn from this. Despite the fact that W & W appearance and wet and dry wrinkle recovery progress linearly and in relation to each other over this entire series, there is a dramatic change in the *mechanism* responsible for W & W appearance, in the range of 3-4% resin solids, as evidenced by the existence of two entirely different configurational patterns and an abrupt transition between them.

One might infer correctly the reasons for this, but a more valid approach to the explanation of this phenomenon may be had through introduction of the concept of "internal" and "external" distortional forces. Internal distortional forces would be those which will cause the fabric to distort due to some discreet change in a fabric member, such as longitudinal stretching or shrinkage, or lateral swelling of the fibers, relative displacement of fibers, or relaxation of tension or change in crimp of the yarns. External forces would be those resulting from contact with objects, for example, the twisting, pounding, pressing, flexing, stretching action of the wash.

It is known that, below the level of 3-4% resin solids, cotton fabrics are not completely dimensionally stable to washing. At the 3-4% resin level, essentially complete stabilization is obtained, and higher resin solids have no further effect on dimensional stability. It appears, then, that the severe wrinkling pattern most evident on the untreated sample, and present in decreasing degrees until it vanishes at 3-4%, is the result of an internal distortional force-dimensional shrinkage. In this range, fabric wrinkle recovery has little effect.

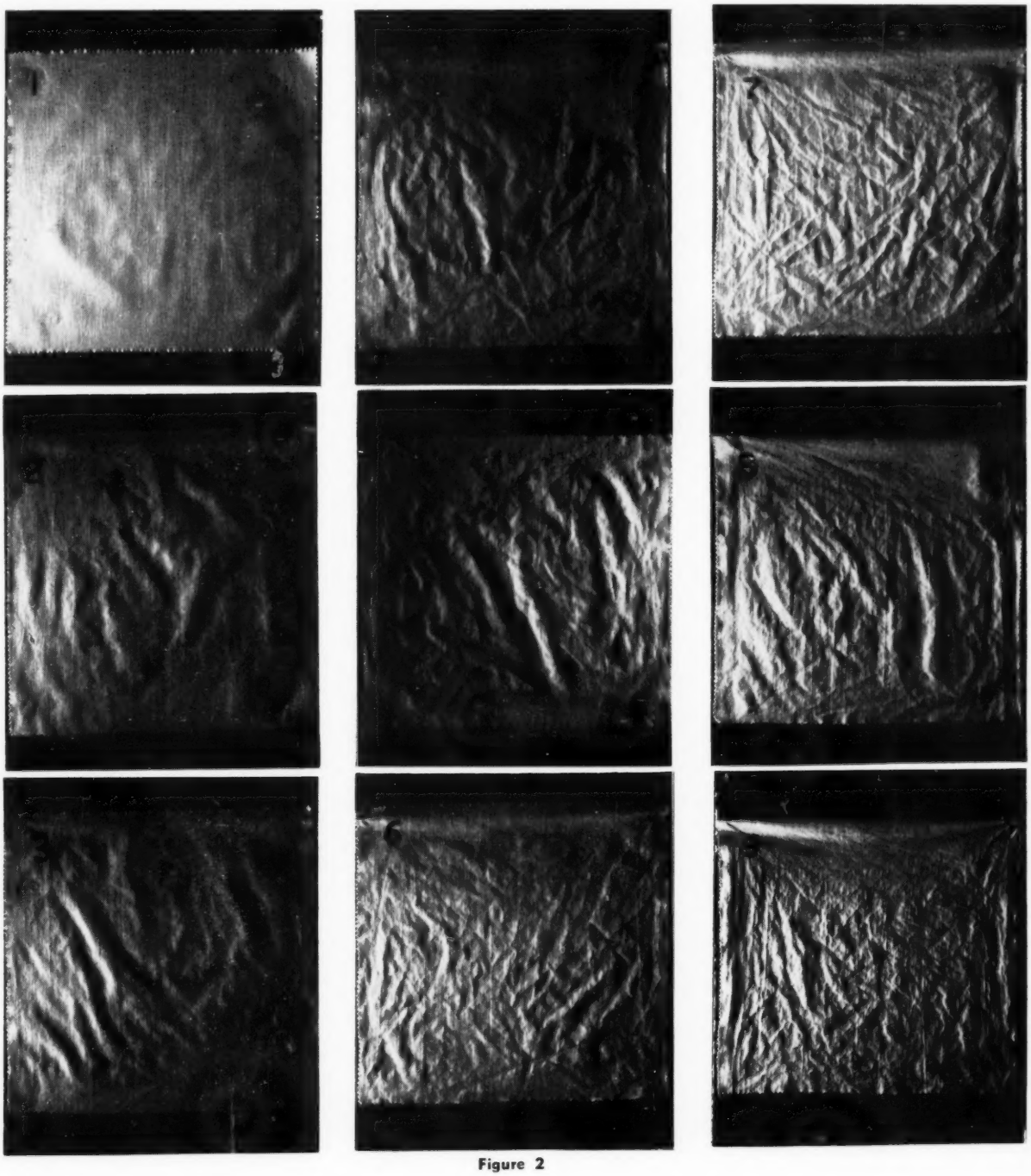


Figure 2

Wrinkle recovery is dependent upon the elasticity of the fibers, which influences their return to the shape they conformed to in the original fabric. If the relative positions of the fibers are changed, eg, by shrinkage, the recovery of their original shapes in these new positions does not return the fabric to its original configuration.

The correlation of W & W with wrinkle recovery in this low resin, low W & W, low wrinkle recovery region is therefore more apparent than real. The correlation is due, we believe, to the directly proportional influence of resin treatment in this range on both dimensional stability and wrinkle recovery. In this region, it is concluded that W & W is primarily dependent upon dimensional stability, and incidentally correlates with wrinkle recovery.

Above the threshhold of dimensional stability, where the rippling-creasing phenomenon exists, exterior distortional forces are of prime importance. The long uninterrupted creases, and large smooth ripples are the results of folding and twisting

and general mechanical working. It appears most logical that here W & W should be directly related to the ability of a fabric to recover from deformation. Hence, the correlation of W & W with wrinkle recovery in this range is real: W & W is dependent upon wrinkle recovery.

One important question still remains, however. Which type of wrinkle recovery is responsible—wet, dry, or both? This experiment provides no answer, due to the direct proportionality of wet and dry wrinkle recovery under these conditions. As no means was available to us for the independent variation of these properties on cotton, it was necessary to seek an answer to this question on rayon, where it is possible to vary these properties independently.

RAYON———Three series of treatments on a rayon challis were prepared to give the following sequences of fabric properties: 1) a range of high wet wrinkle recovery at relatively low dry wrinkle recovery (W); 2) a range of high dry wrinkle recovery at relatively low wet wrinkle recovery (D); and 3) a range of wet and dry wrinkle recovery where wet and dry are approximately proportional to each other (DW). In addition to wet and dry wrinkle recovery, these fabrics were evaluated for dimensional stability and W & W appearance. Dry wrinkle recovery was determined by AATCC Test Method 66-1956 *(7)*. Wet values were obtained by the same test, using a five-minute immersion in 0.1% Santomerse S followed by blotting of excess moisture immediately prior to the test.

The fabrics were washed by the same procedures used for the cotton series discussed earlier *(5)*. W & W ratings after this wash were obtained by direct comparison with this series, under AATCC 88-1958 lighting conditions *(1)*. Dimensional stability was determined by direct measurement without tension on pressed samples, original and after the wash. The results of this experiment are given in Table I.

No direct correlation of W & W with any of the individual properties measured is found to be the same for the different treatments. In fact, some very odd relationships can be derived from plots of W & W as a function of dry wrinkle recovery or shrinkage. However, in the wet wrinkle recovery-W & W relationship, all three treatments show reasonably good correlations which are similar, though not the same. Figure 3 presents this relationship graphically for the three treatments.

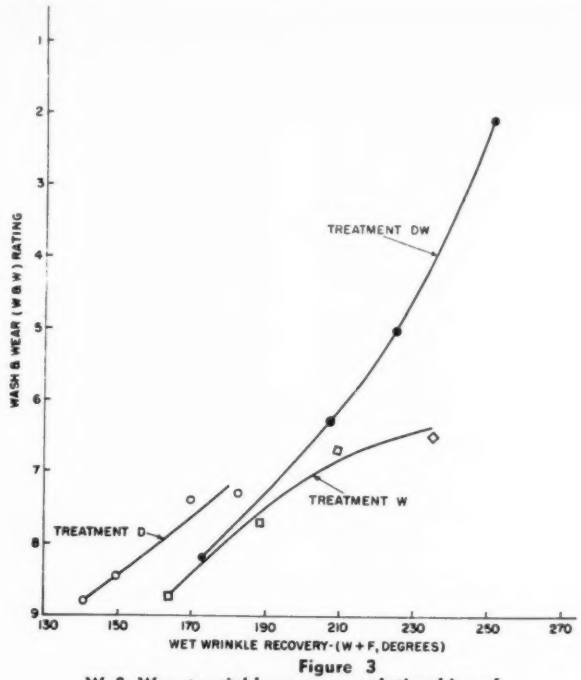


Figure 3
W & W-wet wrinkle recovery relationships of various treatments on rayon challis

It is observed that the D treatments give approximately one unit better W & W at the same wet wrinkle recovery than either the W or DW, and this is apparently due to better dry wrinkle recovery at this low wet wrinkle recovery level. Treatments W and DW are nearly identical at low wet values, but then diverge rapidly, with the W treatments plateauing at a W & W of 6.5, and the DW treatments improving in W & W at an *increasing* rate with wet wrinkle recovery.

It will be noted that the maximum W & W level achieved by the W treatments (6.5), in spite of high wet wrinkle recovery, is in the low region where the dimensional stability mechanism still governs. These fabrics fail to achieve good W & W because of poor dimensional stability, or the presence of internal distortional forces.

The D samples possess reasonably good stabilization, and high dry wrinkle recovery, but very low wet wrinkle recovery. Their poor W & W can therefore be directly attributed to poor wet wrinkle recovery, or inability to recover from exterior distortional forces, when wet.

The DW treatments are the only ones which produce good W & W, because these fabrics are the only one which possess the ability to resist interior distortional forces (dimensional stability) and recover from exterior distortional forces (wet wrinkle recovery). The improved dry wrinkle recovery undoubtedly has a beneficial effect, and is probably responsible for the increasing slope of the W & W—wet wrinkle recovery relationship of the DW treatments, but it is the least important of the three mechanisms.

TABLE I

Physical properties of rayon challis with various treatments

Treatment	Wrinkle recovery W & F (°) Dry	Wet	Area shrinkage (W & F, %)	W & W rating (1 Best to 9 Worst)
W1	156	164	20.0	8.7
W2	147	189	18.0	7.7
W3	131	210	12.5	6.7
W4	106	236	9.0	6.5
D1	211	141	9.5	8.8
D2	237	150	4.5	8.5
D3	234	170	3.0	7.4
D4	235	183	2.5	7.3
DW1	174	174	8.0	8.2
DW2	190	208	4.0	6.3
DW3	221	226	2.5	5.0
DW4	237	252	1.5	2.1

DISCUSSION

The results of these experiments indicate that there are two distinctly different forces, internal and external to the fabric, which cause poor W & W performance, and that any

(concluded on page 39)

Southeastern Section———

SYNTHETIC AND NATURAL FIBER AND YARN PROCESSING AIDS*

CHARLES H LIGHTHIPE and RALPH G SCHAUBHUT

Technical Director
Industrial Div
Nopco Chemical Co

Chief Chemist
Textile Chemicals Lab
Nopco Chemical Co

Machinery for processing the natural fibers was built to handle cotton and wool and not the synthetics. When the synthetic fibers were brought to these machines, many problems arose.

Antistatic lubricants are the modern successful tools for aiding the processing of fibers. The library of information gathered over the years on frictional and antistatic chemical data provides the lubricant manufacturer with the background data he needs. It becomes his task to balance these properties so that the finished lubricant will have the proper combination of fiber-metal friction, interfiber friction, antistatic activity, stability, viscosity, and solubility to give optimum properties to the fiber being processed. His abilities are in constant challenge due to the ever-changing demands of the industry: new machinery, higher speeds, more hydrophobic fibers, variable blends.

INTRODUCTION

FIBERS are like people—some are fat, some are thin. There are "sky scrapers" and "peanuts." Some are rough, others are smoothies. There are those that "wear a crimp well" and those that are straight-laced and stiff as a ramrod. Where lubrication is concerned, some are born lubricated and others become "well-oiled" later on. Groups of fibers, like groups of people, are complicated. The sociologist and the psychologist, studying groups of people, make many observations and tests to "come up with" an hypothesis which, when tried and true, may become established as a theory.

Like the danger in judging the group by the action of an individual, the study of fiber processing is often oversimplified or underestimated. Perhaps the handling of groups of fibers is more akin to processing a bunch of recruits to become an army. Groups of fibers from all walks of life suddenly require regimentation. They must be torn from their homes, separated from one another, brought in contact with large numbers of other similar or different fibers, lined up into neat platoons (then they get drafted), and finally go to war on a card, a mule, a frame, or a loom.

The old soldier sometimes doesn't think very much of the new recruits (those products from the spinneret or the converter). The boss carders and spinners have some choice words to "learn to the sergeants" when the attempt is made to mix the old-timers (wool and cotton) with the still-wet-behind-the-ears new synthetics (the privates).

Cotton technology became established only through many years of labor, so that today a cotton man might say (given the average cotton fiber and the machinery which was built to handle this fiber), "I can spin cotton yarn."

Wool technology, with its roots nurtured in antiquity, grew up through the industrial revolution with machinery adapted to its needs —short fibers for the woolens, long fibers for the worsteds.

Nature provided the big brothers, cotton and wool, with remarkable attributes adapted to the spinning of yarns. She gave wool the scales and cotton the convolutions. Man designed the specialized machinery to handle these naturals — each, however, with its own specialized system. Thus, we have the Cotton System, the Woolen System, the Bradford System, the American System, the French System, etc.

Along came the new babies — viscose, acetate, polyamide, polyester, and acrylic fibers, etc—the so-called man-made fibers. Some prefer to think of them as they are referred to by our English cousins — the ungodly fibers — at the risk of being sacrilegious. The new babies we are now faced with have smooth skins and tender behinds. Yes, we are in the diaper stage. The Pacific Converter and the Turbo Stapler actually became necessary, as the advantages of modern production demanded speed and more speed. Of a sudden, the subtle contributions of nature to the naturals became acutely lacking in the personalities of "nouveaux enfants."

How are we going to make men of these babies? Can we attach scales or spin convolutions? The chemists and the physicists began to stir their stumps. We can put a crimp here — we can lay that cowlick down—and many "doctors" began to experiment and meet the challenge. One of the most dramatic contributions came from the chemist familiar with the principles of fiber lubrication. He demonstrated that the addition of the right lubricant would do the same work on the new fibers' surface that the scales or the convolutions did: a somewhat different concept from the old-fashioned idea of simple reduction-of-friction type lubrication. Also, in some cases, it was necessary to locate superior lubricants. Not only that, but other plus values could be blended in. Static control was assured after careful study, and soon the new babies started to get up off the play-pen floor and test their legs.

New phrases sprouted up, such as fiber cohesion, interfiber friction, fiber-to-metal friction, mass cohesion and stick-slip. Such phrases were forming the new language for the thriving science of fiber processing.

Workers in the field were soon demonstrating that fiber length, fiber diameter, and fiber surface can be modified by proper lubrication to give balanced fiber-to-metal and fiber-to-fiber friction as well as static control.

What background of experience existed out of which new growth was to come? What could be learned from the histories of the natural fibers?

NATURAL FIBERS

Let us look at the natural fibers briefly. As previously stated, nature provided the worsted fiber with a long length, fineness, crimp, and surface structure so that the subsequent machinery for processing this fiber was built to handle just these characteristics. Lubrication for processing was best fulfilled by the use of olive oil. It was common practice through-

* Presented by Charles H Lighthipe before the Southeastern Section on April 18, 1959 at Cedartown, Ga.

out the industry that oiled top was allowed to age for some three weeks before further processing. It may be visualized that the fiber-frictional requirements for carding and combing were different than those for subsequent drafting and spinning. The lubricant changed its character during the three weeks storage. The latter or oxidized form of the lubricant performed in a superior manner as a processing aid by increasing interfiber friction for those operations after combing.

During and after the Spanish Revolution, the resultant virtual elimination of the supply of olive oil for textile lubrication purposes forced a choice of substitutes upon the industry.

During the development of the substitute lubricant, it was recognized that an improvement might be made which would eliminate the need for the three weeks aging of the top.

As in all fields, need for accelerated production produced newer and newer types of lubricants, so that today the modern worsted lubricant is as distant in similarity from the early olive oil as the present rocket Oldsmobile is from Jack Benny's Maxwell.

Woolen fibers differ basically from the worsted in fiber length—they are the shorter wool fibers. As such, they not only require a different system of machinery for their handling, they require different lubrication. The accepted lubricant for woolen fibers for many years was red oil or oleic acid. This processing aid served a dual purpose. It provided lubrication for carding and spinning and was converted to soap in the fulling operation. Demands upon the industry brought about by increased production speed plus quality, both in the areas of yarn production and in the dyehouse, dictated a need for improved wool oils. Again, it became possible to produce brand-new types of wool lubricants with many plus values.

Nature has been truly abundant in her delegation of characteristics to the cotton fiber. Although comprising the shortest fiber length of all the natural fibers, the convoluted structure plus the surface lubrication supplied by the wax coating permitted cotton yarns to be made without additional fiber-processing aids.

When the invasion of the textile market by regenerated cellulose became economical and functional to the cotton manufacturer, it brought along the use of processing aids to enhance the performance of these fibers on the cotton system. At that time, the beginnings of exploration were made and many first questions were asked. If a lubricant can make the difference of success or failure in processing a synthetic fiber, is it possible to improve the processing of the cotton fiber? We shall come back to this question.

SYNTHETIC FIBERS

What happens when the *synthetic* fiber is scheduled for:

a) Worsted system processing?
b) Woolen system processing?
c) Cotton system processing?
d) Tow-to-top converting?

The obvious answers to these questions are that these synthetics either must be made similar to their natural counterparts, or entirely different mechanical systems for handling must evolve, or a basic study of fiber characteristics must be made and these must be associated with mill performance. Each of the above approaches has, in fact, taken place and is continuing.

FACTORS IN FIBER PROCESSING

Let us examine the factors involved in fiber processing.

Individual fibers have the following physical geometry:

A) length
B) diameter
C) crimp
D) surface
E) body

and the following chemistry:

F) characteristic molecular grouping
G) specific moisture regain
H) particular dyeability
I) additive effect of producer's finish and delusterants.

Groups of fibers have the following geometric form:

A) bale stock
B) web
C) lap
D) sliver
E) roving
F) yarn
G) fabric.

INDIVIDUAL FIBERS———Considering the individual fiber, let us examine in more detail the effect of physical geometry.

A) *Fiber length* determines the system whereby the fiber will be processed, from the extremes of the jute or linen system in the manufacture of rug yarns, which use the longest fibers, to the cotton system, which processes the shortest. The influence of fiber length can be critical in the ultimate success in producing the yarn, eg, in the settings of the drafting rollers in the cotton system. A whole area of study of measurment and instrumentation has evolved on this subject alone. In worsted system processing, including tow to top conversion, *variable* fiber length enhances processing; thus systems in conjunction with fiber properties must be defined.

B) *Fiber diameters* are characterized by the well-known (and many not so well-known) cross-sectional photographs of fibers. They are round, flat, serrated, dog-bone, ribbon, tubular, etc. Diameters express the amount and kind of surface in a given fiber system.

C) *Fiber crimp* or waviness is variable from straight to high crimp. It is measured mostly by the number of waves per centimeter. More useful are the values of "crimp intensity" and "stability of crimp."

D) *Fiber surface* is characterized by striations, pockets from dyeings and dryings, delusterant variations, etc. These phenomena are readily observable by means of the microscope. Attention to careful observations provides the answers to puzzling fiber-process performance.

E) *Fiber body* concerns the properties of a fiber as expressed by its modulus and its strength and, in an interpretive sense, limits the range in which a fiber may be considered as acceptable for spinning into a yarn. A fiber may be too strong as well as too weak for processability. The measurement of rigidity under flex adds knowledge to this portion of fiber technology.

Now let us consider effect of the *chemistry* of the individual fiber.

F) Influence of *particular molecular grouping* effects the electrostatic potential to a major degree. Orientation and aging characteristics of antistatic agents are related to this fiber property.

G) The *natural moisture regain property* of the fiber has great influence on the frictional and electrostatic processability of the fibers as related to their specific fiber-to-fiber and fiber-to-metal frictional characteristics.

H) *Particular dyeability* of a fiber is studied where especially dark stock-dyed shades have to be processed in fiber form. Shades like the blacks, browns and navies have caused problems. The excessiveness of the dyeing process, or the percentage of the added dyestuff, or a combination of both results in a dyed

fiber distinctly different from either the undyed fiber or corresponding light and medium shades.

I) The additive effect of the *producer's finish and the delusterant* are as important in the total chemistry of the fiber as any other single aspect. Comparison studies of scoured or extracted fibers will reveal the importance of the fiber lubricant (producer's finish) in its role as a processing aid. Comparison studies of bright vs dull members of the same fiber will reveal a considerable variation of frictional properties attributed to the delusterant.

FIBER GROUPS——Of the studies involving measurement and interpretation of fiber assemblies, much is practiced on yarns and fabrics. There is an ever-growing interest and concentration, however, in the other areas of fiber assemblies. Studies have been made by many authors to show distinct relationships between fiber processability and such measurements as sliver strength, drafting forces, stick-slip, roving-twist, twist multipliers, condensing factors, etc. Much of the work in this field has been done by the fiber-producer laboratories and has led to accelerated advances in the handling of their fiber in the consumer's mill. So often we have heard that the same fiber at two mills at different locations will handle quite differently. It is through knowledge and study of fiber assemblies as well as individual fiber properties that the keys are provided to unlock the doors of understanding.

FRICTION AND STATIC —— Throughout all fiber processing, two strong forces influence processability. These are friction and static. Friction may be further subdivided into fiber-to-metal friction and fiber-to-fiber friction. The following examples illustrate where *fiber-to-fiber friction dominates* the processing operation:

1) Picking—rags and garnetting
2) Opening process
3) Carding—in formation of the web, in the strength of the web, and in the strength of the sliver.
4) Condensing of the roving
5) Drawing and drafting
6) Spinning.

The following examples illustrate where *fiber-to-metal friction dominates* the processing operation:

1) Transfer of fibers on and off card clothing and rolls
2) Doffing of the web
3) Drafting of long fibers by additional means of pins as in gilling and pindrafting
4) Combing operation
5) Action of rings in spinning
6) Action of the converter in converting tow into top
7) Coning operations
8) Knitting, weaving, braiding, sewing, etc.

Thus it may be seen that everywhere throughout textile fiber and yarn processing we are dealing with friction. It in turn, given the right conditions, creates static electricity. The effects of static manifest themselves as a problem in every phase of operation and especially so where production dictates high speed. The familiar lapping on the rolls, married ends, excessive fly, uneven wind, picks, etc, are manifestations of the undesirable effects of static.

INSTRUMENTS AND MEASUREMENT

Having examined the factors involved in fiber processing, what do we do about them? By now it is recognized that the fiber lubricant is an important, although temporary part of the fiber itself. Most friction measurements on given synthetic fibers are actually measurements of the fiber lubricants on the fiber's surface, and are not a function of the fiber itself, although usually reported in that way. When different frictional values are obtained for the same lubricant on different types of synthetic yarns, these can be shown to be related to the geometry of the fiber rather than the chemical natural of the fiber. Two entirely different fibers can give identical measurements.

The fiber lubricant manufacturer must measure friction and static in order to design optimum lubricants. We should consider the strides which the textile industry's educational institutes, the fiber producers' laboratories and the lubricant manufacturers' laboratories have made in measuring and evaluating friction and static. A precise and enlarged science now exists, which has had an accelerated growth throughout the past twenty years.

Static friction is the value of the limiting friction just before slippage occurs. Kinetic or dynamic friction is the value of the limiting friction after slippage occurs.

Most modern instruments are able to measure both static and dynamic friction. One such instrument is the Inclined Plane Tester. It consists of an inclined plane, which supports a strand of continuous filament yarn. A synchronized stop watch measures the time it takes a metallic rider to traverse a given length of yarn. By calculation, we arrive at a coefficient of friction value.

One may adapt the same instrument to the measurement of static fiber-to-metal friction by raising the inclined plane to that point at which the metallic rider starts to move.

These methods of testing are well suited to the study of fiber lubricants even though absolute values may not be obtained. Testing procedure involves measurement first of the yarn containing the producer's finish. This sample then becomes one of the reference yarns. Next measurement is on solvent-extracted yarn. This sample then becomes another reference yarn. Extracted fiber is retreated with the new lubricant under study. The effect of the new lubricant can be observed by the comparison of its frictional properties to that of the two reference yarns.

Where fiber-to-metal friction is to be measured on short fibers, such as staple, the use of strain gauges coupled to continuous recording devices is most suitable. A single fiber under a known load is drawn across a metallic surface.

Fiber-to-fiber friction is measured in a similar manner where a similar fiber or group of fibers is substituted for the metallic surface. Coefficients of both static and dynamic fiber-to-fiber friction are readily calculated from the charts obtained.

There is another area of frictional measurement which uses fiber assemblies as the test element. Sliver strengths are measured by the Instron tester. Drafting forces are measured by the Draftometer (an instrument in use at the North Carolina State College School of Textiles).

All of these measurements are vital to the study of fiber lubrication. The relationship of the friction parameters (ie, static to dynamic) to each other makes it possible to predict fiber and yarn performance.

Electrostatic forces are measured in the laboratory by various instruments suited for the testing of fibers, yarns or fabrics. The AATCC resistivity apparatus is one commonly used. Other instruments are based on the principles of measuring charge leakage and charge build-up. Results obtained by the charge-leakage method are expressed in terms of seconds of 1/2 life for a standard

TABLE I

Relationship of fiber-metal friction of some common fiber lubricants as applied to viscose yarn (0.5% owg) and measured by the incline plane tester

	Coefficient of friction
Ester A	0.249
Ester B	0.238
Mineral Oil A	0.265
Mineral Oil B	0.273
Softener A	0.293
Softener B	0.283

TABLE II

Fiber-metal friction relationship of an antistatic fiber lubricant series as applied to nylon yarn (0.5% owg) and measured on the incline plane tester

	Coefficient of friction
Antistatic Lubricant A	0.317
Antistatic Lubricant B	0.245
Antistatic Lubricant C	0.214

TABLE III(a)

Antistatic ½ life relationship of a group of coning oils applied to nylon yarn (2.0% owg) as measured by the charge leakage method

	Antistatic ½ Life (seconds)
Coning Oil A	600
Coning Oil B	1,300
Coning Oil C	52,000
Mineral Oil A	109,000
Producers Yarn	174,000

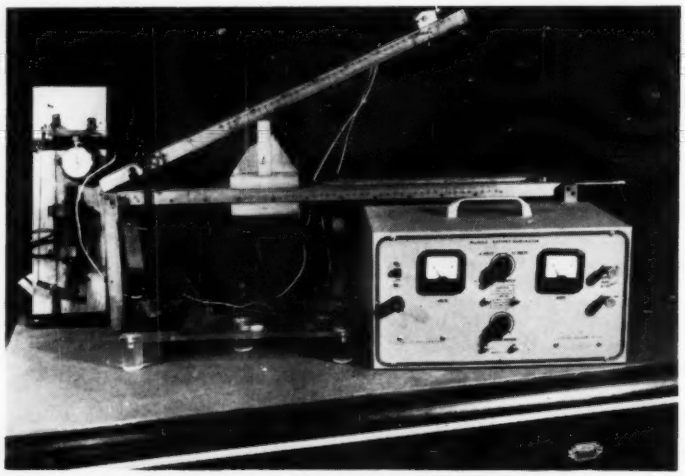
(Temperature 72°F, Relative Humidity 50%)

TABLE III(b)

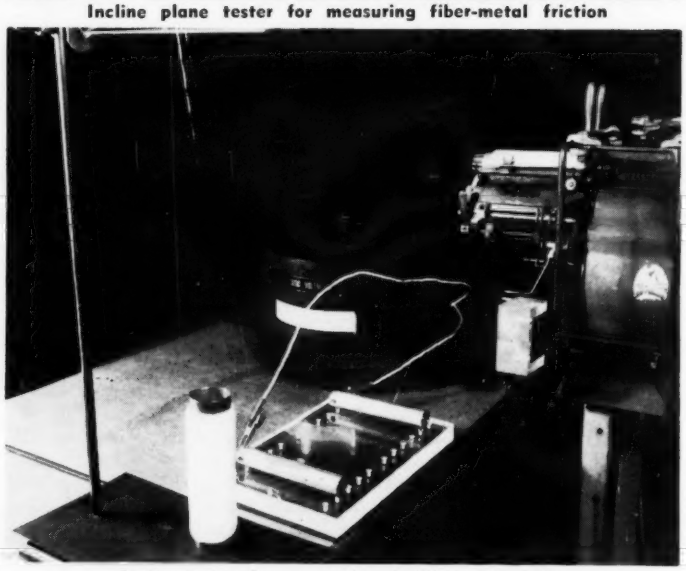
Antistatic relationship of the same group of lubricants tested in Table III(a) but as measured by the charge build-up method

	Yards	*Charge build-up (static volts)*
Coning Oil A	16,500	160
Coning Oil B	16,000	0
Coning Oil C	1,500	160
Producers Yarn	450	160
Mineral Oil A	200	160

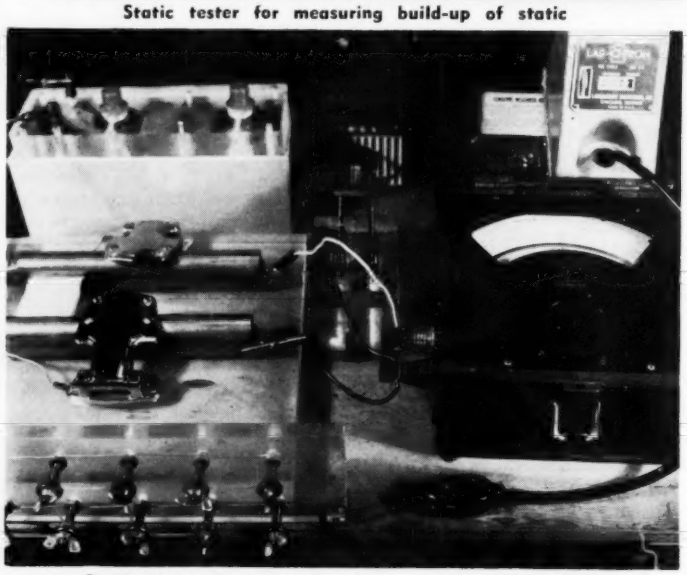
(Temperature 72°F, Relative Humidity 50%)



Incline plane tester for measuring fiber-metal friction



Static tester for measuring build-up of static



Static tester for measuring leakage of applied charge

charge to leak off the textile element under test. Results of the charge build-up method are expressed according to the rate at which the voltage builds up, eg, kilovolts/minute.

These instruments allow for the testing of antistatic chemicals suitable for application to fibers and yarns to achieve improved processability. Results show, for example, that

a) the same antistatic agent is not suitable for all fibers,
b) amount of antistatic agent is as important as type of antistatic agent,
c) evenness of application is important for antistatic effectiveness,
d) aging on the fiber can occur, resulting in loss of original effectiveness, and
e) lubrication and friction are closely associated with antistatic performance.

LUBRICANT MANUFACTURER'S ROLE

The fiber lubricant manufacturer doesn't have a textile mill at his disposal daily. The instruments and measurements from his physical testing laboratory are his tools. They are in constant usage. Over the years, a tremendous library of data is accumulated. Lubricants and antistatics begin to form into general patterns and designs. For example, certain esters are found to have high fiber-to-fiber friction and low fiber-to-metal friction. At the opposite end of the scale, so to speak, cationics have low fiber-to-fiber friction with high fiber-to-metal friction. Intermediate are materials such as mineral oils and vegetable triglycerides.

With these long-known and well-established generalities on frictional properties and the knowledge of antistatic agents, it becomes the task of the fiber-lubricant manufacturer to balance these properties so that the finished lubricant will have the proper combination of fiber-metal friction, interfiber friction, antistatic activity, stability, viscosity, solubility etc, to give optimum properties to the fiber being processed. It is not enough for the lubricant manufacturer to calculate a blend of components on the basis of the demonstrated additive properties of these components. More often than not, those components are by their chemical nature incompatible and the ultimate achievement of a stable blend of the desired components comprises a proprietary art. His abilities are in constant challenge due to the ever-changing demands of the industry: new machinery, higher speeds, variable blends, more hydrophobic fibers.

As we achieve these advancements in the design of fiber lubricants, we must have parallel achievements in the design of equipment to insure the uniform application of these treatments to the fiber. This is especially true in the cotton system of processing where laboratory work has demonstrated that as little as 0.25% of a particular fiber processing aid will appreciably improve yarn strength; yet this has not proved out in mill trials because of difficulties in obtaining uniform application. The scope of this problem can be visualized when we consider that, for optimum results, this small quantity of additive must be distributed evenly over the tremendous surface afforded by 100 pounds of fine fiber. The woolen and worsted industry achieves this distribution by the use of water as a diluent. No such technique has yet been worked out for cotton-system processing.

APPLICATION AREAS OF FIBER-PROCESSING AIDS

Let us recount some of the problems which are most likely to arise in this new world of man-made fibers. Some of the examples given will be actual case histories while others will be given for illustrative emphasis.

1) The manufacturer of a machine which converts tow into top requested an antistatic agent which will work on all fibers. Discussion of the problem developed the fact that all of his difficulties were not due to static, but that proper lubrication was intrinsic to the solution of this problem. An antistatic agent does not work independently of the fiber or of the lubricating agent. It has to work in cooperation with them. As the type of fiber, denier size, crimp and fiber length vary, the requirements of lubrication vary drastically. There are times where strong interfiber friction is needed. There are times where lowering of interfiber friction is needed. No one antistatic lubricant can at one time raise and at another lower interfiber friction. Therefore, a series of three antistatic lubricants was recommended (possessing three different degrees of interfiber friction) to be used by diagnosing properly which type of lubrication is required for fast, balanced machine operation. Because this converting machine handles all types of fibers, it may be visualized that large-diameter and short-length fibers would require a type of lubricant to increase interfiber cohesion; whereas long, fine fibers with high crimp would require the opposite type of lubrication. At the same time, static would have to be controlled in both types of fibers.

2) A woolen mill desired to incorporate caribou hair into a blend in order to achieve a unique design effect. The problem is that the fibers are quite susceptible to static.

It was demonstrated that treatment of the fibers, not with just an antistatic agent but rather a proper antistatic lubricant, not only achieved antistatic control but made the fibers more wool-like, actually increasing fiber-to-fiber friction, so that they blended with the wool. It was further demonstrated that from 1.25 to 1.75% of lubricant was required. Smaller amounts showed no effect.

3) A worsted mill reported that a certain blend of 50-50 admixture gave approximately 50% noilage.

Examination of the two fiber components showed them to be very dissimilar in their fiber-to-fiber frictional characteristics. The solution was to change those properties to make them similar. This could be accomplished by treating one or both fibers. Actually, in the particular case involved, it was sufficient to change the fiber which had excessively low fiber-to-fiber friction into one having a higher degree of interfiber friction by the application of 0.5% antistatic lubricant.

4) A mill reported that its dyed Dacron top needed treatment due to loss of original antistatic lubricant during the dyeing process.

Reapplication of an antistatic lubricant was accomplished with greatest uniformity at the backwasher. Installation of a shallow trough containing a 10% solution of antistatic lubricant above the third bowl allowed a uniform 1% owf application, which satisfied subsequent gilling and pin drafting and spinning operations.

5) A woolen mill reported that it was unable to full properly, ie, unable to achieve the head shrinkage in a particular tightly woven style of fabric. It was noted that the fabric stuck in the trap and also stuck on the metal slide chute in the fulling mill.

It was shown that, by modifying the fulling formula to lower the wet-fabric to metal lubricity (this work was done in the laboratory), one

could enable the fabric to slide normally in the trap and in the chute and thus permit the head shrinkage to occur naturally.

6) A mill reported that it was having difficulty in napping a certain grade of cotton fabric.

It was shown that the particular finish used caused an overly high fiber-to-fiber friction, which resisted the action of the napping clothing to raise the nap. By changing the finish, ie, by lowering the fiber-to-fiber friction, one enabled the fabric to be processed in a normal manner.

7) A knitting mill reported that, although a certain yarn appeared to work well on the needles, a sleazy stitch resulted.

It was shown that, although the fiber-to-metal friction of the yarn lubricant had a very low value, resulting in low tensions and good needle performance, the fiber-to-fiber friction properties were too low, which allowed the yarn to slide on itself, resulting in very poor loop formation and stitches. By changing to a lubricant with similar low fiber-to-metal friction but with higher fiber-to-fiber friction, the mill was able to meet and satisfy requirements.

8) A sewing thread manufacturer reported that a sewing yarn lubricant performed in a superior manner on the high-speed laboratory test but acted poorly in a certain consumer plant.

It was shown that the fabric which the consumer was sewing had a much higher fiber-to-metal friction than the test fabric. The needle thus became overheated due to the fabric-to-needle friction, not the thread-to-needle friction. Recognition of the cause allowed a change in the fabric finish, which cleared up the problem.

CONCLUSIONS

Fiber and yarn processing aids are applied to both natural and synthetic fibers and yarns. They are compounded materials into which much thought and study have gone before they come into use or are recommended.

We are dealing today and will deal tomorrow with many new fibers and blends. It is interesting to note that it took viscose rayon 50 years to achieve modern processability. We recently celebrated nylon's 20th anniversary. Synthetic-fiber producers are doing their best to provide the mills with fibers and yarns for maximum performance. Improvements are achieved daily.

Because these new members of the constantly growing fiber family are each different from the other, there will be need of modifying their frictional properties in order to achieve maximum mill performance. One of the best sets of tools available to the mill man is a series of good antistatic fiber lubricants. By study and understanding of his starting materials and by application and judgment of proper processing aids, the transition from experimental to practical can be made with a minimum of trial and error.

CALL FOR NOMINATIONS—— HAROLD C CHAPIN AWARD

THE Harold C Chapin Award may be presented annually, at the National Convention, to a Senior member, of at least twenty years continuous membership, who has contributed outstanding service in enabling the Association to attain the objects for which it was founded.

The selection is to be the unanimous choice of a Committee consisting of one member from each of the four National Regions, to be selected by the Councilors of the respective Region: the President of the Association, ex-officio; and the Executive Secretary serving as Secretary of the Committee without vote. Each Regional member shall serve for four years; except that the four Regional members of the first Committee shall serve one, two, three and four years respectively, the number of years each particular member is to serve to be determined by lot. The Chairman of the Committee shall be the senior member; the senior member to be that elected member whose term first expires. No member shall be re-elected for at least one year following completion of his term.

The membership of the Committee as constituted for 1959 is as follows:

G O Linberg, *Chairman,* N E Region—one year

D W Robinson, Central Atlantic Region—two years

S Springer, Western Region—three years

A H Gaede, Southern Region—four years

G P Paine, Secretary

The Award shall be in the form of a suitably worded, framed, illuminated scroll.

Members of the Association are requested to submit to the Committee, through the Executive Secretary, the names of those members deserving consideration for the Service Award.

Please address your nominations to:

G P Paine, Executive Secretary
AATCC National Headquarters
P O Box 28
Lowell, Mass.

Future Papers

THE following list is comprised of papers submitted to date for publication in future issues of the *Proceedings.* Authors and Technical Program Chairmen are requested to examine this list and call our attention to any omissions.

"Practical Experience with the Pad-Roll Dyeing Machine"—Robert M Lesh and Frank Percarpio, Northern Dyeing Corp; John S Thackrah, E I duPont de Nemours & Co, Inc

"Relation of Dye Structure to Properties of Disperse Dyes. 1) Anthraquinone Blues. 2) Diphenylamine Yellows"—V S Salvin and R A Walker, Celanese Corp of America

"Knit Goods of Orlon Acrylic Fiber—Processing and Dyeing"—G Robert Turner, E I duPont de Nemours & Co, Inc

"History of Nonwoven Development at 3M"—Burton E Frank, Minnesota Mining & Mfg Co

"AATCC Looks Ahead"—Charles A Sylvester, chairman, Technical Committee on Research

Committee reports presented at joint AATCC - CATCC Research Meeting

Washington Section———

FLUOROCHEMICALS: THE NEW IDEA IN TEXTILES*

EDWIN J GRAJECK and WILLIAM H PETERSEN

Chemical Division
Minnesota Mining and Manufacturing Co
St Paul, Minn

INTRODUCTION

IN the January 1959 issue of *Popular Science,* in an article condensed the same month in *Reader's Digest,* author Harland Manchester describes fluorochemicals as the "chemical daughters of the wildest hellcat of elements, fluorine." A yellowish-green gas, fluorine makes water burst into flame, chews through glass and asbestos, and is otherwise extremely difficult to harness. By contrast, its chemical offspring are stable, orderly, useful.

Fluorides, both inorganic and organic, belong to the older, better-known branch of the fluorine family, as do the somewhat more complex fluosilicates and fluoborates.

It was only in recent years that the more adventurous investigators sought by commercial means to combine fluorine and carbon to begin a completely new family of fluorochemicals.

One of the earliest successful efforts was the creation of a group of chlorine-fluorine-carbon compounds by Thomas Midgley, Jr. These are now widely used in mechanical refrigeration and in all types of cooling machinery under such trade names as "Freon", "Genetron", and "Isotron" chloro-fluoro hydrocarbons.

Then, Prof Joseph Simons of Pennsylvania State University passed a direct electric current through hydrogen fluoride and a hydrocarbon to produce a fluorocarbon. Fluorine replaced all hydrogen in the hydrocarbon to form a perfluoro chemical. Researchers advanced the Simons method to develop truly new chemicals with properties entirely their own — properties not duplicated by any other material, natural or man-made. Some of these chemicals are:

Plastics, which are unaffected by strong reagents, and which resist high temperatures as well as fungus, water, and oil.

Surface-active agents, which reduce surface tension twice as much as the best soap, and are not affected by either strong alkalis or strong acids.

Rubber that can be boiled in oil.

Finishes for textiles, paper, and leather, which resist both oil- and water-borne stains.

These are the fluorocarbons, the new branch of the fluorine family.

The aforementioned magazine articles describe a bottle of liquid divided into red, green, and colorless layers. As the articles point out, the bottle can be shaken vigorously to blend the three layers; but when it is put down, they separate quickly into the original pattern. The demonstration suggests today's applications of fluorocarbons: the top layer is a red-colored motor oil; the center, green-colored water; while the colorless bottom is a liquid fluorocarbon, which is immiscible with both the oil and the water.

The three-phase bottle graphically illustrates one of the outstanding properties of selected fluorochemicals — they can impart both oil- and water-repellency. Thus, a variety of fibrous materials — textiles, paper, felt, leather — can be treated so as to resist water- and oil-borne stains, in addition to possessing water-repellency equal to the best water-repellents known.

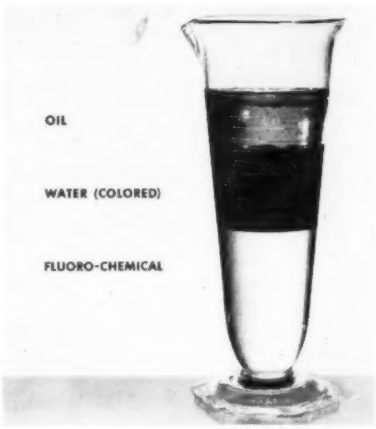


Figure 1
Fluorochemicals, being considerably heavier, "float both oil and water"——— the principle behind their use as an oil- and water-repellent textile treatment.

APPLICATION TO TEXTILES

Initial laboratory work resulted in the development of a fluorochemical suited only to substantive application to wool fabrics. In this somewhat limited method, the wool fabric was thoroughly wetted in a dye beck or dolly washer, the pH adjusted to about pH 3.0, and the fluorochemical exhausted onto the fabric.

Laboratory effort continued. Now, the target was to extend the application range of the fluorochemical stain-repeller to include cellulosic and the many synthetic fibers. The limiting factor was the need to exhaust the fluorochemical. It had been recognized that the most versatile piece of equipment in textile mills is the padder; and that, for maximum range, this equipment had to be the heart of any application method. Potential fluorochemicals were screened and modified for padder application. A pad method was developed. Wool, rayon, cotton, and some synthetic-fiber fabrics were processed, and the results were most encouraging.

The treated fabrics were not only water-repellent, but had oil-repellency and durability to commercial drycleaning as well. Thus, salad oil, lubricating oil, oily dressings, ink, carbonated beverages dropped on the fabric, remained on the surface as drops and were easily blotted up with absorbent tissue or cloth. Control fabrics, spotted in the same manner, were—in a word—a "mess."

Application methods were developed at a number of textile plants, commission finishers, and spongers. Cloth for slacks, uniforms, suits, decorative fabric, upholstery, and many other end uses was, and is being processed in increasing volume. In the method here described simply,

* Presented by Edwin J Grajeck on February 20, 1959, before the Washington Section.

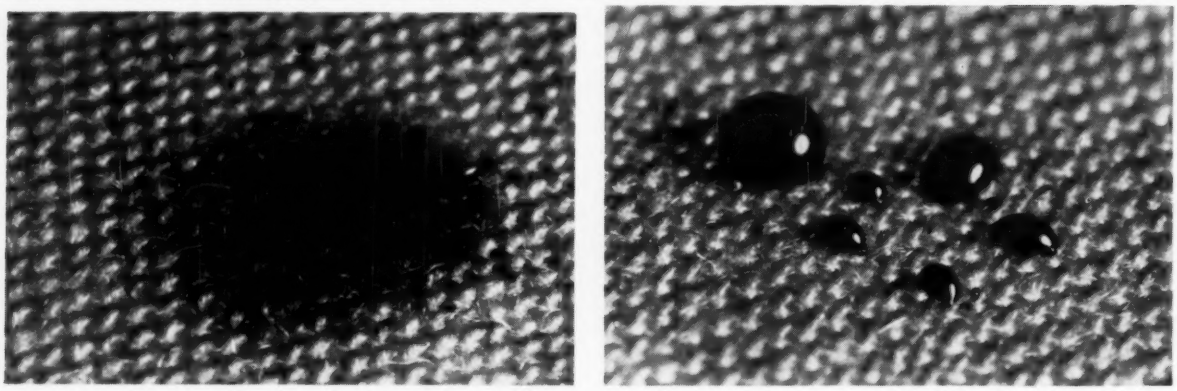


Figure 2
Two highly magnified views of ordinary gabardine subjected to oil droppings; on the fluorochemically treated fabric (left), the droplets sit on the surface; on the untreated piece, they have merged and been absorbed by the fabric.

dry fabric is immersed in a bath containing the fluorochemical, extracted through squeeze rolls, and then dried. A variety of pad boxes are suitable, the important consideration being uniform and thorough wetting in minimum volume of pad liquor. Squeeze rolls of various descriptions have been used, their function being uniform distribution of pad liquor across the width of fabric. It has been determined that a moisture pickup of 70-80% produces optimum results.

Drier requirements are also flexible. Satisfactory performance has been obtained on straightaway and multipass tenter dryers, as well as on conveyor and loop driers. The necessary cure conditions will vary with the equipment, but in general, temperatures around 250°F for five to 10 minutes are recommended. In certain applications, however, as will be pointed out further on, cure temperatures around 300°F are absolutely necessary.

Following the application of fluorochemical, no further finishing operations are recommended. This would include such mechanical operations as napping, brushing, and shearing, and such wet-finishing operations as application of hand modifiers, softeners, mothproofers, antistats, etc. If, for one reason or another, the treated fabrics must be reprocessed or reworked, it would be well to test those fabrics for fluorochemical properties and retreat if necessary. On the other hand, decating, pressing, and calendering operations generally improve oil- and water-repellent properties of fluorochemically treated fabrics.

A series of such textile chemicals is now available under the tradename Scotchgard Brand Stain-repeller (marketed by the Chemical Division, Minnesota Mining and Manufacturing Co, St Paul, Minnesota): FC-149, FC-139, FC-148, and FC-154.

FC-149 is the chromium complex of a fluorochemical acid. It is intended primarily for upholstery or decorative fabrics which will be neither laundered nor drycleaned. In most cases, the green color of this chemical affects shade, and adjustments to compensate for the shade shift must be considered. FC-149 can be applied to most fabrics containing cotton, rayon, acetate, and nylon.

FC-139 is an anionic stabilized emulsion of a fluorochemical resin intended specifically for substantive application to wool and worsted apparel fabrics. Properly treated fabrics have good water- and oil-repellency, durable through a number of commercial drycleanings. The chemical has very little effect on fabric properties such as shade and hand. Anionic in nature, the chemical's substantivity depends on the acidity of wool; increasing acidity results in increased rate of substantivity.

FC-148 is a cationic stabilized emulsion of a fluorochemical resin designed for fabrics which are in the pH 4 to 8 range. It is most readily applied by padding, although it can be adapted to exhaustion techniques. FC-148 imparts a high degree of oil- and water-repellency, which is also retained for a number of commercial drycleanings.

FC-154 is primarily a nonionic stabilized emulsion of a fluorochemical resin, which can be applied successfully by padding to a wide range of apparel and decorative fabrics. Although durable through many drycleanings, it is not recommended for fabrics which will be laundered.

As the technology of the textile fluorochemicals was broadened to include numerous application areas, questions regarding compatibility with a variety of other finishing agents had to be answered. Studies were initiated to this end. Preliminary screening established textile chemical FC-154 as the most versatile and compatible member of the fluorochemical series.

Most of the thermosetting resins are suitable for co-application with FC-154—among these, urea- and melamine - formaldehyde, ethylene urea, dimethylol ethylene urea, etc. In several cases, as with certain resin-based water-repellents, the combined effect might be considered synergistic, giving better water- and oil-repellency at lower concentrations than either chemical can alone. It is impossible to state categorically that all representatives of a given resin class will produce satisfactory performance; each one must be studied separately; and it must be remembered that curing conditions specific for each resin must be met. Generally, temperature requirements approach 300°F, which is more than adequate for the fluorochemical alone.

Permanent-type flameproofing finishes, specifically those based on melamine resins, are compatible, provided the flameproofing is first applied to the fabric. At present no recommendations can be made for the co-application of mothproofing compounds or antistatic agents.

Hand modifiers must be evaluated individually. The hand can usually be "firmed up" with selected additives without loss in oil- or water-repellency; but the use of softeners must be closely controlled since their use generally results in some loss of water-repellency.

We do not intend to cover all possible co-application areas. Indications

are good, however, that suitable combinations are possible to meet all normal requirements.

It has already been noted that the new fluorochemical finishes have been accepted in such textile fields as apparel and decorative fabrics. They are also being utilized in the automotive industry. Consider, for example, convertible tops. These had defied all attempts to seal them completely against moisture seepage —until the fluorochemicals. Convertible tops treated with fluorochemical materials inhibit wicking of water and oily residues at the seams, and thereby eliminate unsightly discolored dry-out marks.

Then, too, some models of the 1959 auto line are utilizing fluorochemical finishes for in-plant protection, and are passing that protection on to the new car buyer. The finish's repellent properties facilitate the removal of in-plant stains—oil, grease, cements, and sealers — without residual rings, and eliminate wetting and wicking caused by rain. In fact, the in-plant protection concept can be carried further. It is suggested that delicate fabrics can be treated to minimize damages caused by lubricating oil and perspiration moisture.

In addition, fluorochemical application has been made to work gloves, cloth shoes, hat bodies, and components.

Although considerable progress in fluorochemical finishes has been made, laboratory efforts to develop new chemicals are continuing. Many application areas are under consideration: solvent application for the drycleaner; spray application in furniture refurbishing; aerosol spray cans for the home user; launderable finishes for a wide range of fabrics.

OTHER APPLICATIONS

Our attention has been concentrated here on the application of fluorochemical products to textiles. Yet, fluorochemicals are enjoying a growing interest in their properties and the usefulness of those properties in many other industries:

Leather can be treated during the tanning operation to make it water and oil repellent. Actually, a method of tanning with fluorochemicals has been developed and is being used to tan skins for suede garments and brushed-pigskin all-weather shoes.

Paper makers have found a number of uses for fluorochemicals; because oil and water holdout are very good, several kinds of paper, paper board, and corrugating stock are being processed for packaging.

Surfactants of the fluorochemical family have exceptional resistance to strong alkalis and strong acids, and have excellent wetting properties at extremely low concentrations.

Electroplaters are using the surface-active properties together with the high acid-resistance of fluorochemicals in plating baths.

Floor polish compounders have taken advantage of the wetting properties of fluorochemicals in self-polishing formulations. Small amounts of fluorochemical in the formula markedly improve wetting of the floor surface and leveling of the polish.

Coolant applications are being made of fluorochemical inert liquids in electrical components by the electronics industry.

And so on. The list of applications has hardly begun. The possibilities are nearly infinite, limited only by restrictions of time and the inventiveness of the researchers.

Mechanisms Influencing W & W Characteristics——

(*concluded from page 30*)

fabric must compensate for both of these in order to achieve any reasonable level of W & W performance.

A W & W fabric must be *resistant* to internal distortional forces, for these distortions disrupt the internal structure of the fabric, and preclude the effectiveness of recovery forces. Lack of dimensional stability (shrinkage) appears to be the major internal distortional force. Therefore, in order to possess good W & W properties, a fabric must first be dimensionally stable.

Distortions due to external forces cannot be prevented, so that a W & W fabric must have the ability to *recover* from these distortions. For distortions caused by laundering, wet wrinkle recovery is the predominant requirement, and must be present for good W & W performance. Dry wrinkle recovery has a beneficial effect, but is considerably less important to W & W appearance after laundering than wet wrinkle recovery.

These experiments indicate, but do not prove, that good appearance after laundering can be obtained without high dry wrinkle recovery. However, for distortions caused by wearing, good dry wrinkle recovery is the prerequisite for good appearance. As wearing appearance is as important to the broader concept of "W & W" or "easy care" fabrics as is laundering appearance, dry wrinkle recovery assumes the same importance as wet wrinkle recovery and dimensional stability.

It is logical to assume that these physical principles apply to all fabrics, natural or synthetic, regardless of their chemical nature. Although no evidence is presented here, the known physical properties and W & W performance of the synthetic fabrics are in qualitative accord with this conclusion.

SUMMARY

A fabric must compensate for distortional forces acting both within and upon itself, in order to possess good W & W performance. Achievement of dimensional stability will prevent the development of internal distortional effects, and is a prerequisite for W & W. Recovery from external distortions due to laundering is largely dependent upon wet wrinkle recovery, and only slightly upon dry wrinkle recovery. Recovery from external distortions due to wearing is dependent upon dry wrinkle recovery. The broader and more practical concept of good W & W performance, including wearing appearance, requires a fabric to possess good dimensional stability, and high dry and wet wrinkle recovery.

LITERATURE CITED

(1) AATCC Committee on Wash and Wear, "Wash and Wear Fabrics—Appearance after Home Laundering", *Am Dyestuff Reptr* **47**, P578 (1958).
(2) Monsanto Chemical Company, unpublished data.
(3) Williams, C R, "A Study of Wash and Wear Cottons", *Am Dyestuff Reptr* **45**, P472 (1956).
(4) Lawrence, E W, and Phillips, R H, "Wash and Wear Fabrics", *ibid* **45**, P548 (1956).
(5) Williams, C R, "Quantitative Measurement of Fabric Appearance—Practical Evaluation of Wash and Wear Characteristics," *ibid* **48**, P37 (1959).
(6) Foster, S H, "A Simplified Relationship between the Properties of Resin-Finished Cotton and the Solids Applied", *Textile Research J* **27**, 129 (1957).
(7) *Tech Manual AATCC* **34**, p157 (1958).

Pacific Southwest Section———

PROBABILITY OF A CALIFORNIA TEXTILE MILL*

A C HALL

Member, Mayor's Textile Committee for the Development of the Textile and Apparel Industries, Los Angeles, Calif

I have the deepest respect for chemists and chemical engineers, and have always marveled at the accomplishments of the people in your industry. Let me say at this point, I know nothing about textile chemistry, practically nothing about chemistry in general and, as far as colors are concerned, I doubt if I could name the primary colors. However, I want to talk to you about a subject which I know something about and which should be of mutual interest to everyone in this room.

All of us, I am sure, have at one time or another heard the remark or been asked the question "When will a basic textile mill be established in California?" Now, that is a simple, uncomplicated question, but the answer is less simple and a little more involved. "When *will* one be in operation?" "Is anybody doing anything about it?" "Can the economy here successfully support a mill?" "Is there any real interest among established mills or others in starting operations in this area?" I shall try to answer some of these questions for you in the next few minutes. Probably you have heard answers to these questions or maybe you know the answers.

For several years, the manager of the Area Development Section, C H Dye, Department of Water and Power, City of Los Angeles, has given considerable thought to these questions. He was authorized to make frequent inquiries of the interest being evidenced by manufacturers in other sections of the United States for a California mill. For several years, two fundamental factors became very evident:

1) It was believed that a mill could be successful here. Remember, I said believed. In other words, it was an educated opinion spurred on by specific inquiries.

2) A strong desire to expand the diversification of our rapidly expanding Southern California economy, by attracting another basic industry to this area.

The first step was to gather information and opinions from reliable sources upon which we could either strengthen or weaken our belief. Personal calls on leading mill executives were made during our regular eastern trips, local textile people were consulted, research into the past histories of attempts to establish mills here were made and many authorities were consulted. We gained considerable information and got a lot of different answers; but the factual data were sparse.

Mayor Norris Poulson, always interested in the work potential of our expanding population, was alerted to the possibility of added employment in the garment and textile industry through a newspaper report of a talk made by I "Bud" Whiser, chairman of the California Fashion Center, before a local Chamber of Commerce meeting in 1953, where he stated, "Despite this competition, the apparel industry is the 5th largest in California and 4th in Los Angeles County, with a valuation of $550 million. However, we could do a billion dollar business if the materials were produced here."

He stated further, "Seventy thousand persons were employed in the California apparel industry and of this, 56 thousand worked in local plants."

Mr Whiser stressed that Los Angeles is the sports-wear capital of the world and produced the first casual or leisure style wear — the California wear.

Mayor Poulson immediately called Mr Whiser and named him chairman of a committee known as the Mayor's Textile Committee for the Development of the Apparel and Textile Industries, which included among others, representatives of banks, the apparel, and allied industries. The Mayor requested them to explore the possibility of interesting a mill to locate in Los Angeles.

Now, with organizational effort, we were prepared to get down to business and find out if we had been barking up the wrong tree. You remember, we still had only opinions and a scattering of facts upon which to base a decision on whether or not we should actively promote a textile mill for this area, particularly in the City of Los Angeles. This, I am sure you will agree, was not sufficient reason to present to mill executives as strong arguments in favor of them locating here.

The Mayor's Committee decided that a factual survey must be conducted to determine the economic feasibility of establishing a mill in California. Fessenden Blanchard and Morrell of New York, NY, were engaged to conduct this survey. Their report was published a little over a year and a half ago and was well received by the industry. It clearly set forth the advantages as well as the disadvantages of locating a basic textile mill in this area. The balance between these two factors, I am happy to report, indicates very definitely the economic possibility of such a mill.

The report was furnished to each of our prospects, and to date over 900 copies have been mailed as the result of written requests. Now we had reached a point where we could determine to a fair degree of accuracy how much genuine interest there was among textile officials in a California mill.

I believe you will be interested in the highlights of the report, so let me spend a few minutes going over some of the main points. The market for cotton cloth in this area amounts to 300 million yards per year, and remember, this is based on data obtained two years ago! We have good reason to think this figure is substantially larger today. This figure of 300 million yards is broken down roughly as follows:

	million yards
Print cloth, 80 square	65
Denim	52
Colored yarn woven cotton	29
Broadcloth cotton carded	24
Spun rayon fabrics-	
Butcher linen type	21
Combed broadcloth	19
Twill	10

* Presented at a meeting of Pacific Southwest Section held April 10, 1959 at Los Angeles, Calif.

The remainder is made up of:

Narrow sheeting
Gabardine
Corduroy
Poplin, etc.

On the basis of a local spinning and weaving mill obtaining only 1/5 to 1/4 of this total potential, the report clearly indicated the possibility of a 30,000 spindle mill, and certain textile people whom I call on regularly say it should be 60,000 spindles.

What other important factors must be considered in a decision to locate a mill in this area? How about labor? As you know, the wage rates among textile workers in the Southeast are rising. Just recently most large mills raised the minimum to $1.25 an hour and authorities agree that rates have been and will continue to become fairly well equalized throughout this country. Another important point related to labor costs is automation. Recently I spent a week in the San Joaquin Valley talking to cotton people. Several men I talked with told me that their business would fail in a few months if they attempted to operate with old methods and old equipment.

The report shows the following comparison in labor rates — keep in mind that these figures are two years old. Based on the tufted carpet industry, California rates compared with those of Dalton, Georgia, in the first four labor grades showed California rates were only 1, 5, 7 and 11 cents higher, respectively. These four labor grades represent the largest number of employees by far. Labor costs are a complete study, separate and distinct from other costs, and time will not permit going into further detail. But let me assure you that the old argument "Labor costs are too high in California" is becoming weaker as time goes on.

What about raw material? In other words, cotton. Our California cotton is among the very best and there is plenty available right in our back yard. The point I wish to stress about cotton is this: A California cotton weaving and spinning mill can buy California cotton for $6.50 a bale less than mills in some other areas. The cotton interests whom I talked with recently will welcome a mill. The chance to expand the use of California cotton in cloth presents a good opportunity to the local growers.

What is the situation regarding water and power, since a basic cotton mill uses vast quantities of both? What is the availability, cost, and future of these two important requirements? Power costs in the City of Los Angeles are lower than the average in 15 cities of comparable size, and in most areas outside the City, the cost would be from 20 to 40% higher. Los Angeles water is plentiful and also low in cost, about five cents a ton. Los Angeles is fortunate in having three separate sources of water supply: the Owens Valley Aqueduct, the Los Angeles River, and the Colorado River. Water and power is no problem in Los Angeles City.

There are of course several more factors of importance in deciding upon a mill operation here; such as finishing capacity, actual and potential; transportation; taxes; and building costs, to name a few. These are taken up in detail in the report.

After copies of the report had been mailed to various mill executives, the Committee had reached a milestone in its work. Now we had provided them with factual evidence of the possibility of a successful mill. It was time to weed out those who wanted to move out here merely to enjoy the climate from those who were seriously considering the establishment of a mill. Personal calls on our prospects after they had studied the report indicated serious interest. Even those mills that unhesitatingly stated they would *not* consider the idea told me this: "You will have a basic cotton mill in California eventually." Six mills have indicated serious thought regarding a California mill. Of these, one mill president told me he had been thinking about it for a long time and seriously plans to establish a mill here. In addition, genuine interest has been displayed by individuals who want to form an organization to plan for a mill, and certain people representing foreign textile interests have been seeking detailed information.

To sustain and expand interest in a California mill, Mayor Poulson sponsored a textile luncheon held in New York City just a year ago to which were invited our prospects.

What else is being done to maintain interest in a California mill? Statistics sometimes can be as perishable as fresh fruit. The Mayor's Committee realizes full well that, in a rapidly expanding economy such as we have in Southern California, certain factors, for example, market potential, can change in magnitude rather swiftly. With this thought in mind, the Mayor's Textile Committee has engaged the authors of the original report to make a follow-up study on market potential. It is hoped that other follow-up studies on changing factors will be authorized as time goes on.

You should now have a fairly good idea of some of the things being done to influence the establishment of a basic textile mill here. Much work has been done, and it is our belief that much more will have to be done before such a mill becomes a reality. You, as textile chemists and colorists, as well as all others connected with the industry have a stake in this undertaking.

Employment Register

This column is open for two insertions per year, per member, without charge. Blanks can be obtained from, and filed with, the secretary of the Association, Post Office Box 28, Lowell, Mass. It is understood that these will be open to inspection by prospective employers who can obtain further information from the secretary.

59-7

Education: Student — Graduating with degree in Spain (dyestuffs chemistry).

Position desired: Change of information: *Textile printing*, dyeing, finishing, etc.

Languages: Spanish, French, English and German.

Location: Anywhere in US.

Age: 27; single.

6-29, 7-13

59-8

Education: Cranston, RI High School.

Experience: Foreman colorist and colorist past nineteen years.

Position desired: General foreman —colorist.

Location: Relocate anywhere (New England desired).

Age: 55; married; references.

6-29, 7-13

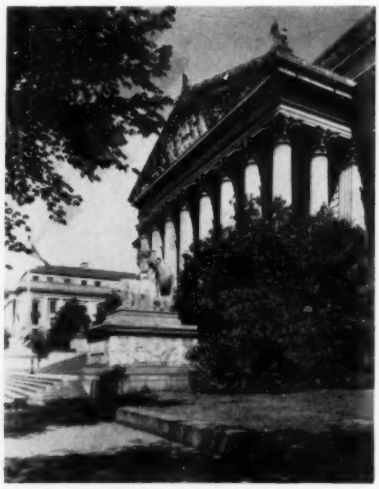
1959 AATCC NATIONAL CONVENTION

October 8, 9, 10 • Hotels Sheraton-Park & Shoreham, Washington, D C

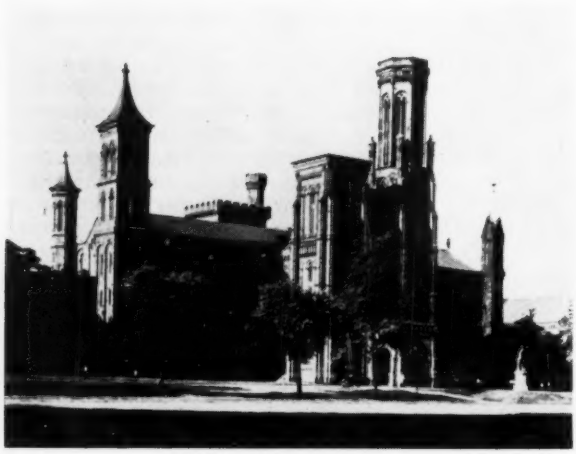
SIGHTS TO BE SEEN IN THE CONVENTION CITY

Statue of Lincoln in the Lincoln Memorial

Thomas Jefferson Memorial
Washington, DC



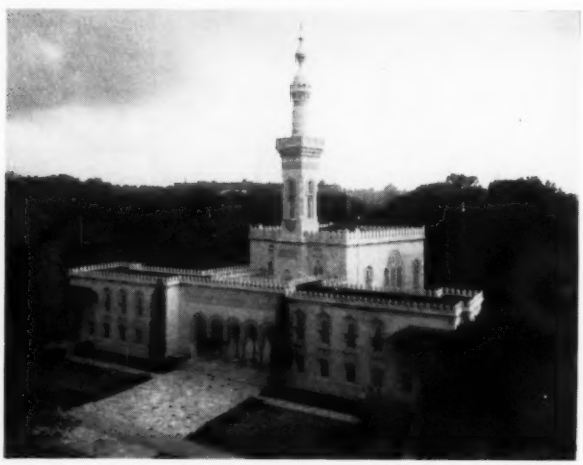
National Archives
Washington, DC



Smithsonian Institution
Washington, DC

Tomb of Unknown Soldier
Arlington, Va

Iwo Jima Memorial
Washington, DC



(Photo by Harris & Ewing)

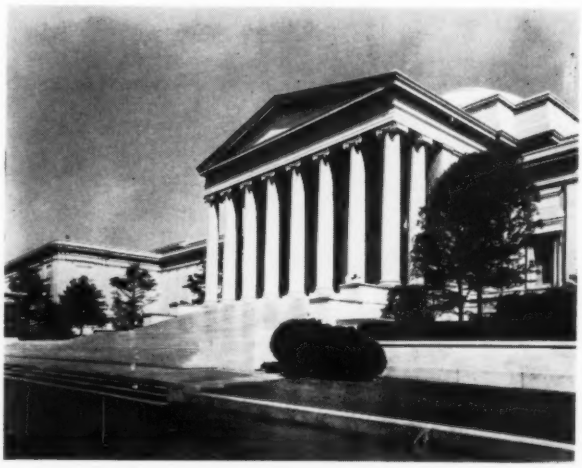
Islamic Center

Front view, White House
Washington, DC

Lincoln Memorial
Washington, DC

Library of Congress
Washington, DC

Home of George Washington
Mt Vernon, Va



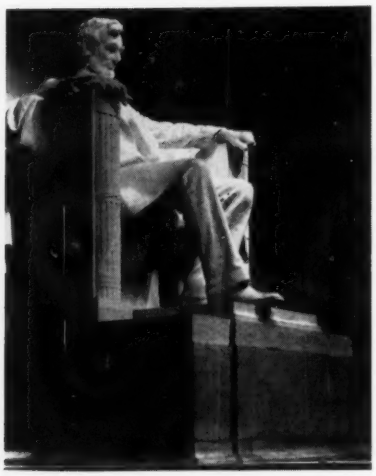
National Gallery of Art
Washington, DC

Supreme Court
Washington, DC

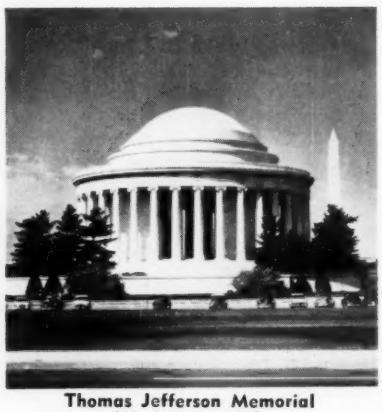
1959 AATCC NATIONAL CONVENTION

October 8, 9, 10 • Hotels Sheraton-Park & Shoreham, Washington, D C

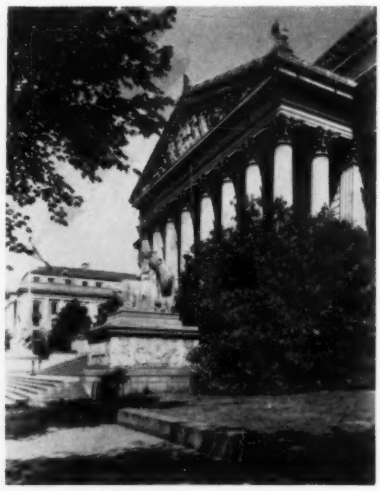
SIGHTS TO BE SEEN IN THE CONVENTION CITY



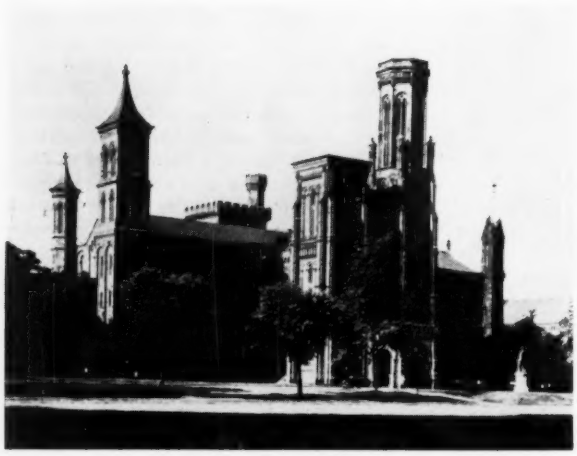
Statue of Lincoln in the Lincoln Memorial



Thomas Jefferson Memorial
Washington, DC



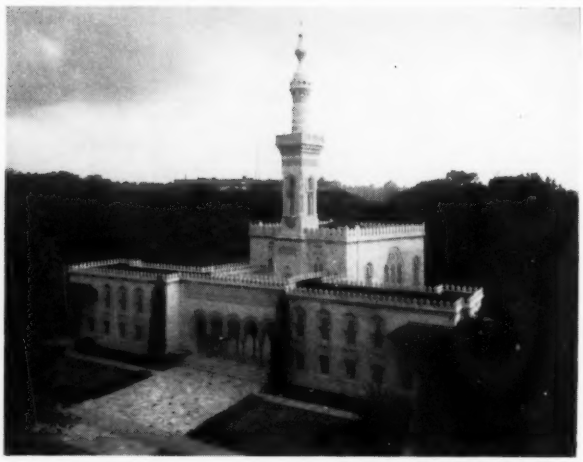
National Archives
Washington, DC



Smithsonian Institution
Washington, DC

Tomb of Unknown Soldier
Arlington, Va

Iwo Jima Memorial
Washington, DC



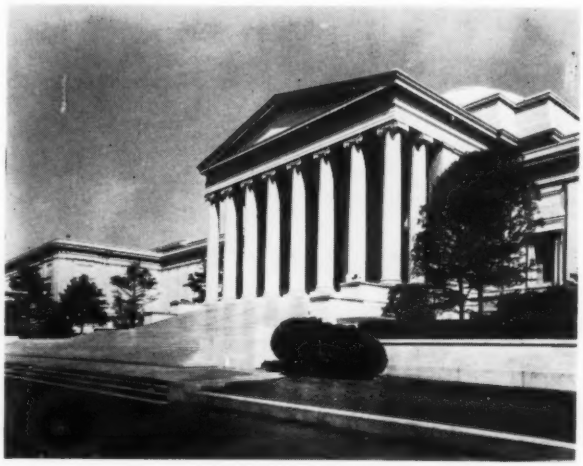
(Photo by Harris & Ewing)
Islamic Center

Front view, White House
Washington, DC

Lincoln Memorial
Washington, DC

Library of Congress
Washington, DC

Home of George Washington
Mt Vernon, Va



National Gallery of Art
Washington, DC

Supreme Court
Washington, DC

Elected Members

No designation after name indicates Senior
(A) indicates Associate
(J) indicates Junior
(S) indicates Student
* indicates transfer from another class of membership

June 18, 1959

DELAWARE VALLEY

Donald P Feyler*

HUDSON-MOHAWK

Page G Mattice
John H Paige

METROPOLITAN

Ernst C K Kraan
Ira Kukin
Guy D Moulton* (J)
Zenon L Salewycz* (A)
Theodore R Trilling Jr

MID-WEST

Robert A Johnson Jr
Richard J Klemer (A)
Donald M Rubin*
Kenneth J Sousa
Joseph G Strem (A)

PIEDMONT

Joe J Cherry (A)
Joseph B Corinth
L Aubrey Goodson Jr
Yates M Harbinson Jr
Kenneth C Isaac
Charles B Palmer*
Vernon S Ryan*
William H Squier*

PACIFIC SOUTHWEST

William A Ingham

RHODE ISLAND

Paul S Bookbinder* (A)

SOUTH CENTRAL

John L Holleman Jr (J)

SOUTHEASTERN

Clarence W Angline
Perry G Myer
George H Nusloch II

Membership Applications

DELAWARE VALLEY

Senior

Anthony E Lintner—Group leader, Detergent Res & Dev, Hagan Chem & Controls, Pittsburgh, Pa. Sponsors: H Brown, H W Zussman.

Phyllis J Kline — Technical asst, Rohm & Haas Co, Philadelphia, Pa. Sponsors: W C Lindsly, A C Nuessle.

Norman A Worthington — Tech service mgr, Redman Process American, New York, NY. Sponsors: M J Maurer, T H Hart.

NORTHERN NEW ENGLAND

Senior

Alfred J Traverse—Treas, gen mgr, Merrimac Knitting Mills Inc, Franklin, NH. Sponsors: G O Linberg, G R Thompson.

METROPOLITAN

Senior

Sidney Berman—Tex technologist, dyeing & finishing, U S Naval Supply Res & Dev Facility, clothing & tex div, Brooklyn, NY. Sponsors: J J Press, R Briganti.

Carl Horowitz—Project engr, Ions Exchange & Chem Corp, New York, NY. Sponsors: G R Thompson, H W Stiegler.

Associate

Takeshi Kohma — Manager, Spun Rayon Piece Goods Div, Toyomenka Inc, New York, NY.

Transfer (Student to Junior)

Walter H Foster Jr — Research chemist, American Cyanamid Co, Bound Brook, NJ. Sponsors: E M Allen, T Vogel.

PACIFIC SOUTHWEST

Senior

Marguerite Naps—Chemist, Shell Dev Co, Emeryville, Calif. Sponsors: G M Kidder, G R Thompson.

Alan C Nixon—Research supv & chemist, Shell Dev Co, Emeryville, Calif. Sponsors: G M Kidder, G R Thompson.

PIEDMONT

Junior

Alston Ramsay Jr—Textile chemist, Ciba Co Inc, Charlotte, NC. Sponsors: A R Thompson, C O Stevenson.

RHODE ISLAND

Senior

William A Illingworth — Partner, treas, gen mgr, Taunton Dye & Print Wks Inc, Taunton, Mass. Sponsors: R H Illingworth, W E Jackson.

Junior

Joseph E Buonanno Jr—Lab tech, Metro Atlantic Inc, Centredale, RI. Sponsors: J C Shore, A N Henschel.

Associate

Richard R Kershaw — Salesman, American Mineral Springs Co, Providence, RI.

Myrven W Pannebaker—Salesman, Original Bradford Soap Works, Inc, West Warwick, RI.

SOUTH CENTRAL

Senior

Smith R Foster—Dyer, Dalton Carpet Co, Dalton, Ga. Sponsors: M S Morrison Jr, R L Mahoney.

Fred W Hemric—Asst, wet finisher & piece dyer, Springfield Woolen Mills, Springfield, Tenn. Sponsors: W L Moudy, F W Smith.

Fort W Seay—Dyer, Rogers Dye & Finishing Co, Dalton, Ga. Sponsors: E Cornelison, R A Madaris.

SOUTHEASTERN

Senior

W Fred Ziegler—Supt, Swift Mfg Co, Columbus, Ga. Sponsors: C B Ray, R E Taylor.

STUDENT CHAPTER

Mahendra K Shah—Student, Lowell Technological Institute, Lowell, Mass. Sponsor: G R Griffin.

UNCLASSIFIED

Senior

Tamas Makray—Technical consultant, Industria Quimcia Mantiqueira, SA, Rio de Janeiro, Brazil. Sponsors: A P Shutts, D H Nelson.

Ignacy Witwicki—Senior research technician, Courtaulds Ltd, Cornwall, Ontario, Canada. Sponsors: G R Thompson, H W Stiegler.

1959 STUDENT AWARD RECIPIENTS

FOLLOWING is a list of students who have received the AATCC Student Award for 1959. The prize (a book) has been awarded together with full membership privileges for the coming year.

Student	*Student Chapter*
Leonard Alves	Bradford Durfee College of Technology
Robert H Barker	Clemson College
Eddie M Barringer	North Carolina State College
William Choupres	New Bedford Institute of Technology
Carl Freeman	Lowell Technological Institute
Arthur W Godfrey Jr	Rhode Island School of Design
Jimmie M Hester	Georgia Institute of Technology
Chia Ren Jin	Alabama Polytechnic Institute
Jean B Letourneau	Philadelphia Textile Institute

AATCC Calendar

COUNCIL, COUNCIL COMMITTEES, RESEARCH COMMITTEES

Sept 10-11 (Hotel McAlpin, New York, NY); Sept 10—Council and Research Committees; Sept 11—TCR, ECR

NATIONAL CONVENTIONS

Oct 8-10, 1959 (Sheraton Park and Shoreham Hotels, Washington, DC); Oct 6-8, 1960 (Sheraton Hotel, Philadelphia, Pa); September 28-30, 1961 (Buffalo, NY); 1962 (Southern Region)

DELAWARE VALLEY SECTION

Sept 18 (Reading, Pa); Oct 23 (Kugler's Restaurant, Philadelphia, Pa.

MID-WEST SECTION

Oct 24 (Bismarck Hotel, Chicago, Ill)

NIAGARA FRONTIER SECTION

Sept 25 (Niagara Falls, Ont, Canada); Dec 11 (Annual business meeting, Buffalo, NY)

NORTHERN NEW ENGLAND SECTION

Sept 18 (Outing—Wachusett Country Club, West Boylston, Mass); Oct 16 (Lexington Inn, Lexington, Mass); Dec 4 (Joint symposium with ASME Textile Engineering Div, Smith House, Cambridge, Mass); Jan 15 (Woodlawn Golf Club, Newton, Mass)

PIEDMONT SECTION

Sept 25-26 (Barringer Hotel, Charlotte, NC)

RHODE ISLAND SECTION

Sept 18 (Management Night); Oct 23 (Prov Eng Soc, Providence, RI); Dec 4 (Annual Meeting—Johnson's Hummocks Grille, Providence, RI)

SOUTH CENTRAL SECTION

Sept 19 (Hotel Patten, Chattanooga, Tenn)

SOUTHEASTERN SECTION

Sept 12 (Ida Cason Callaway Gardens, Pine Mtn, Ga); Dec 5 (Atlanta Athletic Club, Atlanta, Ga)

WESTERN NEW ENGLAND SECTION

Sept 25 (Blake's Restaurant, Springfield, Mass); Oct 23 (Annual Meeting—Rapp's Restaurant, Shelton, Conn); Dec 4 (Hartford, Conn)

Activities of the Local Sections

Ladies Night Dinner and Dance • Hudson-Mohawk Section • May 22, 1959
Schuyler Meadow Country Club, Albany, NY

HEAD TABLE—Standing, l to r: Walter Drautz, treasurer; Floyd J Szurek, chairman; Maurice Fishman, outgoing chairman; Achilles Mafilios, vice chairman. Seated, l to r: Miss Drautz, Mrs Szurek, Mrs Fishman, Mrs Mafilios.

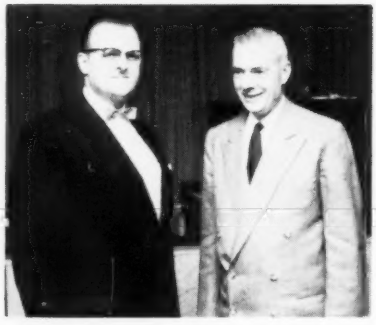
Edward A Chevrette, Apex Chemical Co (left), receives the annual Jack Epelberg Award from Irwin J Smith, Surpass Chemical Co, Award Committee chairman. The award is given annually to a member of the Hudson-Mohawk Section who has contributed most towards the objectives of AATCC and the Section.

New officers of the Hudson-Mohawk Section who were installed at the Ladies Night Meeting to serve for two years (l to r): Walter Drautz, General Aniline Works, treasurer; Floyd J Szurek, Mohasco Industries, chairman; Achilles Mafilios, Ritter Chemical Co, vice chairman. Not shown is Armand Di Meo, Rebel Dyeing Co, secretary.

Ladies Night Meeting • Western New England Section • May 15, 1959

(See report on page 54 of June 15th issue)

HEAD TABLE (l to r): Mrs A W Goodwin; Andrew W Goodwin, chairman, Western New England Section; Henry E Millson, American Cyanamid Co, guest speaker; Elmer J Glaeser, American Cyanamid Co



WNE chairman Andrew W Goodwin (left), greets guest speaker Henry E Millson, American Cyanamid Co

4th Annual Ladies Night • Delaware Valley Section • April 11, 1959

MARDI GRAS a la Delaware Valley — the fourth annual Ladies Night meeting of the Delaware Valley Section—attracted a large crowd on April 11th at Kugler's Restaurant, Philadelphia, Pa.

A gay carnival atmosphere was highlighted by music of a Dixieland Band, while participants engaged in "games of chance" with phony money.

The Ladies Night Program Committee included Section chairman Kevin McChesney, Leatex Chemical Co; Edward S Haack, General Dyestuff Co, program chairman; Joseph J Murphy, Laurel Soap Mfg Co, reservations; Thomas H Hart, Hart Products Corp, and A E Raimo, John Campbell & Co, Inc, games; and Louis R Croce, National Aniline Div, publicity.

Game of dice with phony money as the stakes.

The roulette wheel lures the phony money

Thomas H Hart (left) and A E Raimo distribute phony money to the "gamblers".

Donald W Robinson "auctions" off prizes, as participants use phony money to "bid".

A gift of flowers is presented to the program chairman and his wife (center).

News of the Trade

Carbic Color Name Change

Carbic Color & Chemical Company, Inc has announced that, beginning July 1, 1959, the name of the company will be Carbic-Hoechst Corporation.

Carbic-Hoechst Corp will have a Dyestuff Division and a Pigment Division. The headquarters of the Dyestuff Division will continue to be at its present location, 451 Washington Street, New York 13, NY. The headquarters of the Pigment Division will be located in West Warwick, RI.

Carbic-Hoechst Corp will offer for sale and serve the trade with all dyestuffs, pigments, and textile auxiliaries manufactured by Farbwerke Hoechst AG, Frankfurt-Hoechst, West Germany; Hoechst Chemical Corp, West Warwick, RI; and Durand & Huguenin SA, Basle, Switzerland.

Carbic-Hoechst Corp was originally founded as C Bishoff & Company in 1881. In 1921 this name was changed to Carbic Color & Chemical Company, Inc.

The main factory of Farbwerke Hoechst AG in Frankfurt-Hoechst, West Germany, was started in 1863, and its subsidiary Napthol Chemie Offenbach was founded in 1842.

Beaunit Mills' Vycron in Merchandising Stage

North American Rayon Corp, Fiber Division of Beaunit Mills, has officially started advertising and merchandising of its new polyester fiber, which is being marketed under the trade name Vycron.

Vycron is being produced at the company's new plant in Elizabethton, Tenn, in four types: polyester filament yarn, staple, tow, and direct spun yarn.

Tow for direct spun polyester yarn is said to be an exclusive with North American Rayon Corp. Wide use is foreseen by the company for this type of yarn in raincoating and industrial fabrics.

Several prominent mills reportedly are already weaving fabrics using blends of Vycron with cotton, worsted and other synthetics. Tests are said to have shown that the new fiber's technological advances offer many new fabric possibilities which will be of wide interest to the entire textile-apparel field.

Data sheets covering detailed specifications on Vycron polyester are available to the trade on request from North American Rayon Corp.

Koller

Koller Chemical Co Formed

Howard A Koller has formed his own firm, Koller Chemical Co, in Hazleton, Pa, for the manufacture and sale of oils and chemicals primarily to the textile trade. Mr Koller's entire industrial career has been in textiles.

Mr Koller started with a silk throwing plant in Bethlehem, Pa, as chief chemist and then assistant manager. Following World War II, he was for a short time with Warwick Chemical Co and for the last twelve years was Pennsylvania representative for Specialty Products Company.

Koller Chemical Co will specialize in throwing oils (for silk, rayon, and synthetic yarns) and sizes for the weavers of natural and man-made fibers as well as auxiliaries and finishes for the dyehouse.

Proctor & Schwartz Opens West Coast Office

Proctor & Schwartz, Inc has added a new regional sales office on the West Coast, which allows the firm to make its services available on a nation-wide basis. All present regional sales offices are being retained. The new West Coast office is under the direction of Robert L Hendricks and is located at 8946 Fleetwing Avenue, Los Angeles 45, Calif.

Butterworth Names NE, Southern Agents

H W Butterworth & Sons Co, division of Van Norman Industries, Inc, Bethayres, Pa, has appointed sales agents in New England and the South to sell and service the Butterworth line of textile bleaching, mercerizing, dyeing, drying, and finishing machinery. They are United States Supply Co, Inc, E Providence, RI, and Industrial Heat Engineering Co, Greenville, SC.

Avisco Creates Polyolefin Dept

An organizational realignment of the Research and Development Division of American Viscose Corporation has resulted in the creation of a Polyolefin Department. The new Department, under the management of John A Howsmon, was created to clear the way for rapid action connected with stereo-regular polymers, films and fibers.

Polymer work on polyolefins and polymer characterization, previously in the Basic Research Department, will continue essentially as before but will be transferred to the new Department.

Polypropylene fiber development will be moved into the Polyolefin Department. Robert D Evans, reporting to Dr Howsmon, succeeds Donald Fiedler, who had been in charge of this group before his recent transfer to AviSun Corporation, the jointly-owned subsidiary of American Viscose Corp and Sun Oil Co.

Polypropylene film development will also be transferred. Louis P Deis will continue to be in charge of this group and will also report to Dr Howsmon.

RCI to Build 18th Plant

Reichhold Chemicals, Inc, on June 15th announced the purchase of a 70-acre tract at Newark, Ohio. The property, which is said to be ideally located with respect to industry throughout the state, will be the site of Reichhold's eighteenth domestic plant.

Production of a full line of resins and chemicals is contemplated for the new plant, which represents another step in the RCI program of decentralization to bring the company's producing points closer to customers.

GM Chemical Div Opens New Sales Office

The Chemical Division of General Mills has opened a new sales office at 20800 Center Ridge Road, Cleveland 16, Ohio. The Cleveland sales office is the ninth opened by the division in the past two years.

General Mills' Chemical Division produces Versamid polyamide resins, Genamid liquid co-reactants, fatty nitrogen compounds, sterols and other chemical specialty products for the textile and other major industries.

PTI Awards 12 BS Degrees in Chemistry and Dyeing

Seventy-five students from the United States and abroad were awarded degrees, diplomas and certificates at the 75th Commencement Exercises of the Philadelphia Textile Institute held June 6 at Philadelphia.

Principal speaker at the exercises was William W Tomlinson, vice president, Temple Univ, who was conferred with the honorary degree, Doctor of Laws, by PTI president Bertrand W Hayward.

Tomlinson

Three of the four honorary degree recipients at the 75th Commencement Excercises of the Philadelphia Textile Institute were: (second from left) Don Carlos Echavarria, president, Compania Columbiana de Tejidos, Medellin, Colombia, Doctor of Laws; (center) Prof Frank L Giese, head of the Fabric Design and Development Department, P T I, Doctor of Textiles; (second from right) Henry E Millson, manager, Technical Service Laboratories, American Cyanamid Company, Bound Brook, N J, Doctor of Textile Science. Also in photo are: (extreme left) Edgar Schlesinger, United Merchants and Manufacturers, New York, N Y, who presented Dr Echavarria, and (extreme right) Richard B Stehle, Brehm and Stehle, Philadelphia, Pa, who presented Dr Millson.

Dr Hayward also conferred honorary degrees on Carlos J Echavarria, president, Compania Colombiana de Tejidos, Medellin, Colombia, Doctor of Laws; Henry E Millson, manager, Technical Service Laboratories, American Cyanamid Co, Bound Brook, NJ, Doctor of Textile Science; and Frank L Giese, secretary-treasurer of the PTI Alumni Association, and professor and head of the Fabric Design and Development Dept at PTI, Doctor of Textiles.

The following were awarded the Bachelor of Science Degree in Chemistry and Dyeing (employment after graduation follows in parentheses): George W Bender; Joseph H Bloom (Apex Chemical Co); Lionel Fuhrman (Pearl Embroidery Co); Jean B Letourneau (Celanese Corp of America); James H Lewis; Ronald R Luongo (E I duPont de Nemours & Co, Inc); William H Millman (Milpac Dyeing Corp); Laurence J Moran (Smith, Kline & French); C C Parikh; Ranchhodlal A Patel; Robert L Samson; Edward J Sites.

The following were awarded evening school certificates of proficiency in chemistry and dyeing (employment follows in parentheses): Joseph S Cowdery (Glasgo, Ltd); William E Conrad (Aldon Rug Mills, Inc); William J Orth III (E I duPont de Nemours & Co, Inc).

Jean B Letourneau was awarded the AATCC Prize for the senior student who had shown the greatest proficiency in chemistry, printing and dyeing in his senior year.

The Sara Tyler Wister awards for students with the highest academic standing for the full length of the degree course in chemistry and dyeing went to Ronald R Luongo, first, and Joseph H Bloom, second.

LTI Awards 19 Degrees in Chemistry

Nineteen degrees in chemistry and textile chemistry, four of them on the graduate level, were conferred at 61st annual commencement exercises at Lowell Technological Institute June 14, when Prof Emeritus Elmer E Fickett, former chairman of LTI's textile chemistry division, received an honorary doctor of science degree and the following citation:

"Gifted teacher and wise counselor, through a long and fruitful career as an educator at this and other institutions of higher learning, he has shaped the minds and destinies of many young people, molding their character and guiding their activities through judicious advice and sterling example."

Also receiving honorary degrees were Robert C Sprague, chairman of the board, Sprague Electric Co, who was commencement speaker; Thomas Talbot Clark, LTI trustee and president-treasurer, Clayston Corp; and Very Rev Vincent A McQuade, OSA, president of Merrimack college, who gave the baccalaureate address.

Martin J Lydon, LTI president, conferred 120 BS, 16 MS, and 25 associate in engineering degrees, and Lt Col Benjamin C McCary Jr, USAF, commanding officer of the AFROTC detachment, commissioned 13 second lieutenants in the Air Force Reserve for completion of the advanced ROTC program.

Receiving their degrees in chemistry and textile chemistry were the following, whose future place of employment is also listed:

MASTER OF SCIENCE——*Chemistry:* Paul N McDonagh, PhD study at LTI. *Textile Chemistry*: Carmen Genzabella, PhD study at LTI; Mrs Byiung Jun Park, Fabric Research Laboratories, Inc; Jin Woo Rhee.

BACHELOR OF SCIENCE——*Chemistry*: Robert H Davis (honors); Cynthia L Goebel (honors), DeBell & Richardson, Inc; Carole A Harper (honors), graduate study, Johns Hopkins Univ; Frank S Stankiewicz, Hooker Chemical Division, Durez Plastics; Anthony J Villani Jr. *Textile Chemistry:* James P Casey, National Aniline Div, Allied Chemical Co; Georgia Dadoly; R Carl Freeman (honors), Joseph Bancroft & Sons Co; Toby R Koffman, AATCC national headquarters; Robert J Lippe, Markham Co; Gertrude M Long, Joseph Bancroft & Sons Co; Edmund O Pua, graduate study, LTI; Thomas F Saunders, graduate study, LTI; John J Swistak; A Clifford Woodside III.

Georgia Tech Receives Textile Funds

Cash grants and supplements totaling $28,200 for the 1959-60 fiscal year have been awarded to the Georgia Institute of Technology by the Textile Education Foundation, Inc. Additional funds, up to $30,000, will be made

available for machinery purchases on a matching basis with Georgia Tech funds.

With the exception of a $4,000 grant to the textile technology program at the Southern Technical Institute, all the funds will be used by the A French Textile School.

The various grants will be used as follows: supplements to faculty salaries—$5,200; supplements to faculty travel allowances—$2,000; student scholarships—$12,000; special project to construct exhibits in foyer of W Harrison Hightower Building—$5,000; and the Southern Tech grant.

The Textile Education Foundation was organized by Georgia textile companies in 1943 and its contributions to Georgia Tech's textile teaching facilities since that time have amounted to more than half a million dollars.

UUCC Announces New Agents

The United Ultramarine & Chemical Company, Inc has appointed eight new agents in this country and Canada as sales representatives.

For Alabama, except Mobile, and the eastern half of Tennessee, east of Nashville, in addition to its present territory of North Carolina, South Carolina, Georgia and Florida: Charles L Burks & Co, PO Box 54, East Point, Ga.

For Kentucky, Cincinnati, southern Indiana including Indianapolis and western Tennessee including Nashville: William B Tabler Co, PO Box 1254, Louisville 1, Ky.

For western New York State including Utica, Lowville and Binghamton: James C Meyers Sons, 290 Larkin, Buffalo, NY.

For Denver and surrounding territory: L H Herr & Co, Interstate Trust Building, Denver 2, Colo.

For Texas: JaRo-Chem, PO Box 10544, Dallas 7, Texas, and 2323 Buffalo Drive, Houston 19, Texas.

For Kansas City, eastern Nebraska, Iowa, western Missouri, Kansas as far west as Wichita. and northern Oklahoma: Morton-Myer Sons, 220 East Missouri Ave, Kansas City 6, Mo.

For the St Louis area: Barada & Page, Inc, Foot of Destrehan Street, St Louis 7, Mo.

For Canada: Cyanamid of Canada, Ltd.

United Ultramarine & Chemical Company, Inc is a new corporation set up to market a full range of Ultramarine Blue Pigments. Until recently, American Cyanamid Co had been supplying the North American market with Ultramarine Blue, now available through United Ultramarine.

NSCC Acquires Mexican Chemical Plant

National Starch and Chemical Corporation has purchased Polimeros SA, a manufacturer of vinyl acetate polymers, located in Mexico, DF, Mexico.

Donald Pascal, NSCC president, said that his company had been interested in the possibilities of Polimeros since its founding in 1954. National assisted in the design of the original plant and equipment and had licensed Polimeros to manufacture polymers in Mexico.

Donald E Reese, the founder of Polimeros SA, will continue as president of the Mexican company, which will operate as a wholly owned subsidiary.

Production from this plant has been used primarily by the paint industry for the manufacture of latex paints. Additional equipment will be installed so that a complete line of vinyl acetate polymers, copolymers, and adhesives may be made.

National Starch and Chemical Corporation (formerly known as National Starch Products Inc) is a leading producer of adhesives, starch products and chemicals. Already one of the two largest producers of vinyl acetate polymers and copolymers in emulsion form in the the United States, National Starch and Chemical Corp will extend its pulp technical aid to the new operation in Mexico. A polymerization plant has been in operation in England since last year, and another unit at Toronto, Ont is expected to be 'on stream' in June.

Ontario Section, CATCC, Outing

More than 110 members, guests and friends of the Ontario Section, Canadian Association of Textile Colourists and Chemists, turned out for the Section's annual outing on June 5 at the Cutten Golf and Country Club, Guelph, Ont. The sports program consisted of golfing and horseshoe pitching.

Section president N J Mohoruk greeted the members and guests and delivered a brief address, following which the Section's trophy for low gross score in golf was awarded to C S Humphrey.

The team of J Mansfield and J Bailey took top honors in horseshoe pitching.

Prizes donated by more than 30 companies were awarded to the day's active competitors, following a buffet dinner.

The event was organized and planned by the following committee: J Linton, J Camelford, J Mansfield, A H Miller, and G A Farley.

Smithline Kashara Classics Feature Mitin Mothproofing

All 1959 Kashara classic casuals tailored by Smithline and woven by Northfield Mills will feature lasting protection against moth damage, according to a joint announcement by H Maxwell Goldfine, president of Northfield Sales Corp, and Joseph Miller of Smithline Coat Company, Inc.

Smithline's Kashara fabric — a blend of 30 percent cashmere and 70 percent virgin wool—is now being treated with Geigy Dyestuffs' Mitin Durable Mothproofer at Northfield's Vermont plant, Goldfine said.

According to Mr Miller, the permanent mothproofing of Kashara coats insures retail outlets against costly insect damage during storage and lay-away periods and enables them to stock this best-selling classic in quantities their traffic demands. To help its customers merchandise the mothproofing feature. Smithline is including a Mitin-mothproofed tag on the button or sleeve of all Kashara coats.

Available in a pallet of 16 new-season colors, Kashara's weightless blend is said to be especially adaptable to year-round wear. Smithline's classic casual retails at about $70. at leading department and women's specialty stores throughout the country. The company's sales. executive and showroom offices are located at 252 West 38th St, New York, NY.

Mendell Visiting Societe Nourylande Principals

Edward J Mendell, president of Edward Mendell Co, Inc, Yonkers, NY, has left for Compiegne, France, to visit with the principals of Societe Nourylande. The Mendell Company is the exclusive distributor of Nourylande products in the United States, including dyestuffs, alginates, and auxiliary chemicals.

The Nouraltex alginates, which have been on the market for more than 25 years, are of interest to United States textile mills for use in sizing, finishing, printing and dyeing. It is claimed that the Nouraltex alginates give excellent results when used in conjunction with the fiber-reactive dyestuffs.

Edward Mendell Co, Inc has been carrying a complete line of dyestuffs and auxiliary chemicals for the textile industry since 1946. In addition to stocks carried at the Company's main warehouse in New York, it also maintains supplies of its products at Providence, RI; Charlotte, NC; and Jacksonville, Fla.

Emery Moves NE Sales Office

Emery Industries, Inc, has moved its branch sales office to 751 Main St, Waltham 54, Mass, from its former location in Lowell, Mass. The new telephone number is Twinbrook 3-6358.

Emery's chemical sales representatives, John A Condon and Walter R Paris of the Organic Chemical Sales Department and Tom W Macy of the Fatty Acid Sales Department, will make the new office their headquarters for their New England territories. A warehouse operation will be maintained in Boston to service these departments, as well as Emery's Sanitone Division.

Condon is responsible for the sale of the textile chemical members of the organic chemical line, including Emersoft textile softeners and Twitchell oils and lubricants for worsteds, woolens, cottons, and synthetics.

Beta-S Prices Reduced

Heyden Newport Chemical Corp announced June 16 that it is reducing price schedules as much as 25% on Beta-S, a liquid decarboxylic acid anhydride introduced earlier this year as an epoxy resin catalyst and chemical intermediate.

Effective June 15, the price of Beta-S in 55-gallon drum truckloads is 75c a pound, 76½c a pound in 5000-lb lots, and 80c a pound for under 5000-lb orders. Prices for 15-gal drum sizes are 77c, 79c and 83c a pound for similar quantities. Previous schedule for Beta-S was $1 a pound for all levels.

Beta-S is being produced at the company's semiworks facilities at Fords, NJ. The new product has found use in curing epoxy resins, and as an intermediate for dyes, surfactants, lubricant additives, corrosion inhibitors, fungicides and inks.

Improved Warehousing System for Syl-Mer

A new warehousing system for Syl-mer silicone emulsions has been announced by the Dow Corning Corporation.

Customers in the Northeastern and New England area will benefit from an inventory of Syl-mer emulsions in Dow Corning's warehouse in Jersey City, NJ. Previously shipped from the Greensboro, NC warehouse, the shipment of emulsions from New Jersey will result in greater efficiency in processing in sales and shipping orders, it is claimed.

A new private line, 900-mile automatic teletypewriter system now links Dow Corning's headquarters in Midland, Mich to sales offices in New York, Boston, and Silver Spring, Md and to the company's eastern warehouse in Jersey City.

New School Building Named After Glen Alden Prexy

A new four-story structure at the New School for Social Research, New York, NY, has been named the "Albert A List Building," in honor of the donor of the building.

Mr List is president and chairman of the Board of the Glen Alden Corporation. USF-Aspinook Finishing, one of the largest commission finishers of textiles in the country and reputedly the largest finisher in the field of high-style fabrics used in draperies and slip covers, is a division of Glen Alden.

The new building concludes a four-year expansion program of the School. The building will be ready for occupancy at the opening of the 1959 fall term.

Mr List has been closely associated with the New School for the past ten years. Mrs List is a trustee of the institution.

Nopco Honors Veteran Employees

Ten long-time employees of the Nopco Chemical Company were honored at a cocktail party May 26 at the Hotel Robert Treat as they joined the Newark, NJ, company's 15-25 Year Club. Fourteen others joining the club this year were feted at ceremonies at Nopco's Cedartown (Georgia) plant.

With the addition of these new members, the 15-25 Year Club now totals 263, or 26 percent of Nopco's entire personnel. Of the 263 members, there are 91—nine percent of the chemical company's total population —who have served the company 25 years or more.

Oldest employee, in point of service is G D Davis, who has been with Nopco 43 years. He is the executive vice president of Nopco and was recently named president of Jacques Wolf & Company, which Nopco acquired April 30.

At the Newark ceremonies, Nopco president Ralph Wechsler presented five employees celebrating their twenty-fifth anniversaries with silverware or the traditional gold watch. Those marking their fifteenth anniversaries received gold service pins, and are now entitled to an additional vacation week.

NAMES IN THE NEWS

Brown

Hemphill

York

Donald V Brown has been appointed manager-sales development for the Silicone Products Department of the General Electric Company. In his new position, Mr Brown will direct product planning, sales planning and market research for the department's silicone resin, fluid and emulsion product line.

Before promotion to his new position, Mr Brown was a specialist in marketing research for the department.

Appointment of **William E Hemphill** as sales representative, has been announced by the Lunkenheimer Co, Cincinnati, Ohio, one of the nation's oldest and largest manufacturers of valves. Mr Hemphill will operate out of the Company's Chicago Branch office, covering the Northern Illinois market, including Decatur, Rockford, Peoria and Springfield.

Crown Chemical Corp, Providence, RI, has announced the appointment of **David E York** to the technical sales staff. Mr York will be assigned to market research and product development in the paper, plywood, and allied fields. Previously, he was associated with Warwick Chemical Company as manager of their Philadelphia office. Mr York will make his headquarters in the Providence office.

Gran-O-Top Carding Said to Offer New Approach to Processing of Stock-dyed Blends

Gran-O-Top, a new granular top for cotton cards, is said to offer substantial reduction in flat costs as well as in production savings through the complete elimination of flat wastes.

Mechanical details of the Southern Regional Research Laboratory granular card were disclosed for the first time at the Tenth Annual Cotton Research Clinic of the National Cotton Council. Benjamin Booth Co, Philadelphia, Pa, and Carolina Machinery Co, Charlotte, NC, have introduced the Gran-O-Top, licensed by the US Dept of Agriculture.

It is reported that there has been much interesting conversation and speculation on the possibilities that this carding approach offers in the processing of stock-dyed blends. Whereas the difficulty of stripping and the frequency of stripping previously required as well as the problem of fly made stock dyeing of cotton yarns rather impractical, this new granular top is said to completely eliminate the possibility. The new approach appears to open up possibilities for the development of a wide range of novelty yarns based on the use of natural cotton, stabilized cotton and various synthetics.

Pilot plant operations conducted at the Avondale Mills plant and announced May 14 at the Cotton Research Clinic meetings in Asheville, NC, reportedly indicate that actual production tests improved basic operations over the laboratory tests. Dust, fly, and flat stripping wastes were said to be virtually eliminated.

The combination of this new granular top with the Booth Micr-O-Grind needle point card clothing is said to produce yarn at greatly reduced nep count with longer stripping cycles and much lower stripping waste. Stripping cycles are said to be reduced from once every three hours to once every eight hours with some mills running upwards of 24 hours. Fly is claimed to be eliminated by the completely closed construction. Costs of the new Gran-O-Top are reported to be less than two-thirds those of conventional cotton flats.

A new sales and service organization, to be known as Carolina-Booth, has been formed to serve mills in the Southeast. Operating out of Charlotte, this new sales and service firm will provide a complete line of Booth Micr-O-Grind card clothing and granular tops to the southern textile industry.

These units are now in production.

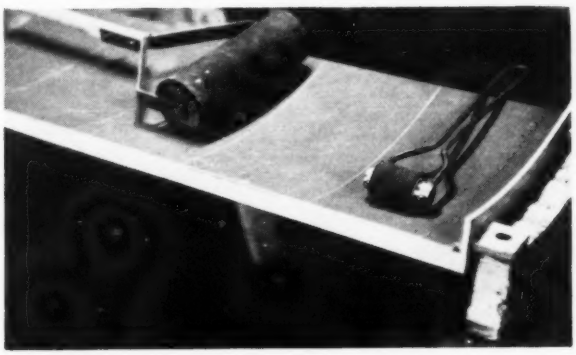


Photo shows ease of rolling on granular surface. This surface is provided in sheet form and has protected pressure-sensitive backing. The entire surface for the top for the complete card reportedly may be replaced in less than two hours by a single worker. The protective paper is removed from the pressure-sensitive backing and granular sheets are rolled on with small hand rollers. Four small bolts permit removal of the entire section without affecting the card adjustment. The granular sheets are said to provide comparable quality at higher speeds and superior quality at normal carding rates.

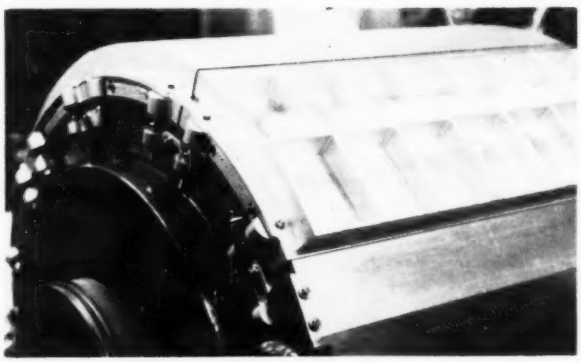


Photo shows ribbed aluminum top in position on card. Note the simplicity of adjustment and the fact that the unit is completely sealed to eliminate fly. This entire unit is said to be rigid, light in weight (200 lbs vs more than 1000 lbs for conventional flat type), and has no moving parts. It is claimed to be quickly, easily and permanently adjusted for any card setting. Four small bolts permit removal of the top without disturbing adjustment.

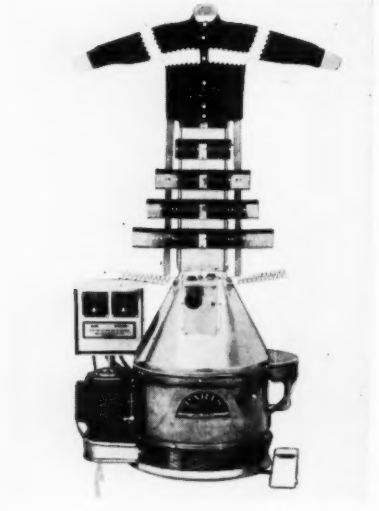
Paris Steam-Air Finisher

A new model of the Paris Steam-Air Finisher was unveiled to the trade at the recent Knitting Arts Exhibition. Under development for many months and now perfected, this machine is said to automatically precision frame and press all sweaters, women's, men's and children's, when preset to a given style and size.

The first Paris Sweater Finisher, shown at the 1957 Knitting Arts Exhibition, was limited to pressing women's sweaters. Later a second and a third model were developed to handle men's and children's sweaters. This current universal model supersedes these three predecessors by pressing the entire size range of all three groups. As the illustrations indicate, this is done by interchangeable top assemblies, which are custom made to produce the contour called for by the manufacturer's particular style or styles.

Among twenty-one improvements over earlier models cited by the manufacturer, the following are said to be most important:

1) Instantaneous manual adjustments, no longer requiring the use of removable sizing pins and Allen



New Model Paris Steam-Air Finisher automatically precision frames and presses all sweaters (women's, men's and children's) when preset to a given style and size

screws, reportedly ensure dimensions correct to a plus or minus variation of ½ inch maximum.

2) Built-in steam-volume control, variable for the entire range of fibers from Orlon through wool, mixtures, Ban-Lon and other modified continuous filament yarns. Combined with this feature are redesigned, faster-acting baffles to direct or deflect the steam to or away from given areas of the sweaters.

This universal Paris also displaces a fourth Paris model, the specialized unit developed last year with the assistance of Joseph Bancroft & Sons Co, for the pressing of Ban-Lon sweaters immediately prior to thermosetting, and subsequently adapted to the final pressing also.

Like earlier Paris Finishers, the universal model presses by the application of steam and air while the sweater is under regulated tension. Thus, it is claimed, with nothing touching any portion of the outer surface of the fabric, all shine or pressure marks from collar trim, ribbing, seams, buttons or grosgrain is avoided. Free from these flaws common to conventional pressing and which are held down only at the cost of lowered production, sweaters come off the machine with improved appearance and with enhanced loft and hand, it is claimed.

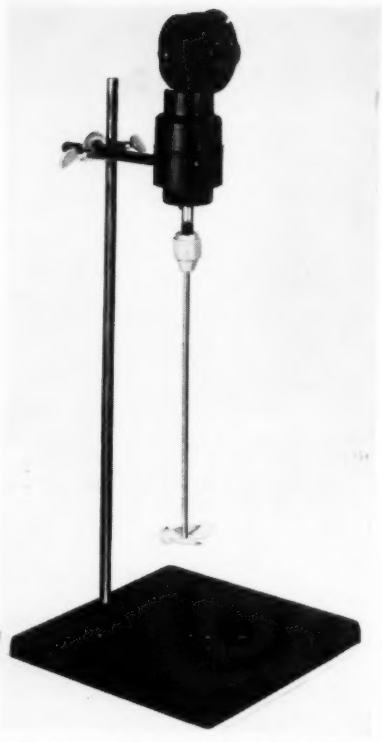
The new Paris press is said to be completely automatic save for placing the garment on and removing it from the machine. This advantage, it is claimed, means that the quality of the finish and, to a great extent, the rate of production is not dependent on the skill of the worker.

Paris Manufacturing Company, Brockway, Pa, and its exclusive distributor, Garment Finishing Equipment Corp, 18 Brattle St, Cambridge, Mass, are expanding their foreign manufacturing and sales facilities. Paris Finishers are being manufactured under license in England by Planning Techniques Ltd, an affiliate of Trubenised (Gt Britain) Ltd, for distribution in Great Britain and several European countries. Exclusive rights for manufacture and sale in Spain have been granted to Villaro y Ca of Tarrasa.

Recent appointments of distributors are: Textile Machine Works, International Division, of Reading, Pa, for Italy and France, where one mill is now using a battery of twelve Paris Finishers; Capron, Carter Pty Ltd in Australia; and Suomen Koneliike Oy in Finland.

Variable Speed Laboratory Mixer

A variable speed lab mixer has been introduced by Terriss Division, Consolidated Syphon Supply Co. equipped with a 1/50 RP motor, it can be set for speeds from 0 to 5,000 rpm. The unit mixes up to five gallons of liquid dependent upon viscosity. It is shipped completely set up ready to plug into a 110 V, single phase AC 60 cycle current. It is fully adjustable up and down at any angle. Price $32.50 fob factory, 22 Wooster st, New York 13, NY.



Terriss variable-speed laboratory mixer

Eccopel Water Repellents A and B

Eccopel Water Repellents A and B, according to Eastern Color & Chemical Co, 35 Livingston St, Providence 4, RI, together form a "two-component package" for single-bath application.

The Eccopel products are said to achieve a water repellency which is semidurable for any fabric. No catalyst is used in their application. and no curing is required. A notable advantage in the use of Eccopels, according to Eastern, is the fact that, under high-speed running conditions, no foaming occurs. The Eccopel "package" reportedly remains stable in solution.

Complete information on Eccopel water repellents for all fabrics is available from Eastern Color & Chemical Co, manufacturing chemists at 35 Livingston Street, Providence 4, RI.

WILL SHE LIVE TO GROW UP?

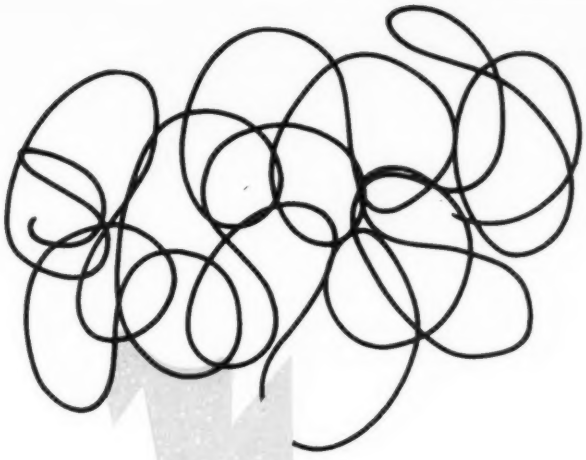
This child has leukemia—one of the most tragic forms of cancer. Only research has kept her alive.

Ten years ago, children stricken with leukemia—cancer of the blood-forming tissues—had only a few weeks or months of life. Today, many of these children have had precious months, even years, added to their lives, thanks to dramatic research discoveries.

Until science finds the means to *save* them, however, they live on borrowed time. The American Cancer Society's research program includes $1,500,000 annually for research related to leukemia. Millions of dollars more are needed to conquer this grim disease—which kills 2,000 children each year, and is taking an increasing toll of adult lives.

Help research find the answers that will save these lives. Give generously to the American Cancer Society's intensive research assault against leukemia and all other forms of cancer.

AMERICAN CANCER SOCIETY®



For the natural lofty Quality of undyed wool— Lyogen SMK

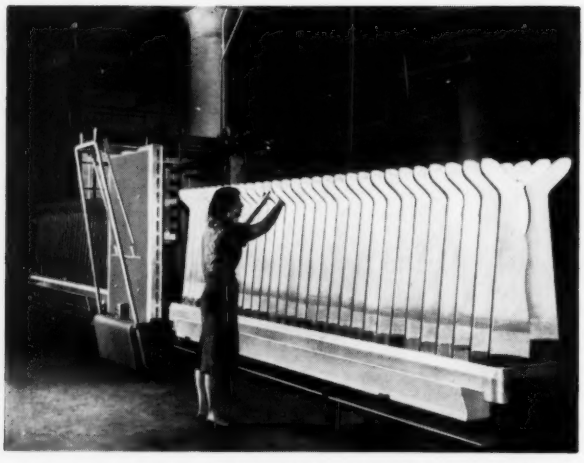
For perfect dyeing of wool at the isoelectric point with Lanasyn colors, Lyogen SMK insures maximum penetration of the dye, level dyeings, top fastness properties, and minimum fiber degradation.

Complete details plus technical guidance are yours by writing, wiring, or 'phoning SANDOZ, INC., 61-63 Van Dam Street, New York 13, New York. ALgonquin 5-1700.

District Offices: Charlotte, Cincinnati, Fair Lawn, N. J., Hudson, Mass., Los Angeles, Philadelphia.

Sandoz

THINKS AHEAD WITH TEXTILES SANDOZ



New Turbo Dye Boarder, which accommodates 120 boards with 60 stockings per cycle, is said to make possible important savings in equipment, labor, water, steam, and floor space.

Hunter photoelectric glossmeter

Turbo Dye Boarder

The new Turbo Dye Boarder, a combination hosiery dyeing and finishing machine, was shown for the first time at the Knitting Arts Exhibition, Atlantic City, NJ, May 4-8.

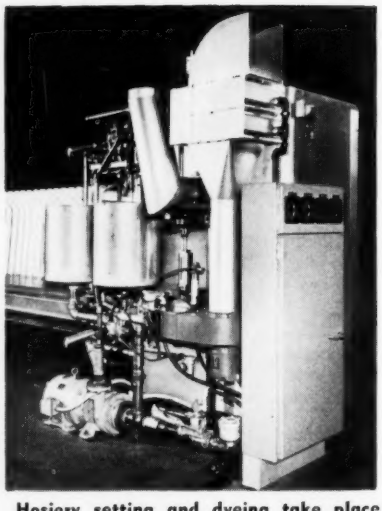
Produced by Turbo Machine Co, Lansdale, Pa, the new machine, which was in operation throughout the show, combines four operations —preboarding, dyeing, postboarding and drying—in one processing cycle. The machine accommodates 60 boards per cycle, and has a reported production of approximately 140 dozen per eight-hour shift, with one operator.

The machine incorporates a new dyeing system that is said to eliminate cumbersome dye storage and supply tanks. As a result, the machine takes very little more space than the conventional preboarder. Live steam is introduced into the cabinet during the dyeing cycle, so that preboarding takes place while the dye solution is circulated and sprayed onto the hosiery.

Following the dyeing cycle, the final setting takes place at a predetermined higher temperature. This procedure is said to provide for absolute uniformity of dyeing at lower temperatures, and to give the best possible match between welt, boot, heel and toe.

Either thrown yarn or raw pirn yarn can be used in welt, boot, heel, and toe, when stockings are to be processed in the Turbo Dye Boarder. It is claimed that, by using raw pirn yarn, manufacturers can provide a better looking, better fitting, and more comfortable stocking, in addition to achieving utmost economy.

The complete processing cycle in the Dye Boarder is 8½ minutes. The operator strips and fills one group of forms while the second group of forms is in the cabinet.



Hosiery setting and dyeing take place at the same time in the new Turbo Dye Boarder. On the control panel, foreground, timing cycles are established for dyeing, steaming, rinsing, and drying. Dye concentrate, hosiery finish, detergent, and lubricant are mixed with water in the pressure-sealed cabinet and sprayed onto the hosiery for deep color penetration. Final setting and air drying take place in the same processing cycle. Stockings are then ready for the pairing department.

With the Turbo Dye Boarder, an adjustment is provided which makes it possible to dye two different versions of the same shade, either lighter or darker, by turning a knob which regulates the amount of dye supplied to the mixture. Pressure dyeing in this manner is said to accomplish a deep penetration of dyes and finishes, reportedly bringing about rich color values, more life and elasticity, better light- and washfastness, better snag resistance, and longer wear.

With stockings going directly from the greige goods examiner to the Turbo Dye Boarder, and from there to the pairer, labor and overhead costs are reduced.

E J Berger, Turbo vice president, has stated "The sum total of tangible and intangible savings is considerable. Consider steam consumption alone. There will be no presetting, preboarding, dyeing and boarding. The only machine in operation will be the Dye Boarder, which takes no more steam than the preboarding operation did before."

Multipurpose Glossmeter

A new photoelectric glossmeter has been designed by Hunter Associates Laboratory, Inc, 5421 Brier Ridge Rd, McLean, Va, for measuring contrast gloss (luster) of textile yarns, fibers and fabrics, and other applications. Accuracy is said to be assured by precise machine construction and assembly of all optical components. Adaptability of the instrument to both standard and new gloss tests is said to be achieved by building elements of the incident and reflected light beams onto aluminum blocks, which are mountable at either 75°, 60°, 45°, or 20°. Because of the ease with which beam and field angles can be changed, the instrument is claimed to be ideally suited for special gloss tests of new products.

The optical and electrical units are in separate housings connected by cable. The instrument can thus be used:

1) with specimen on front as shown,

2) turned on its back with specimen mounted horizontally on top, or

3) with optical unit separate and mounted either flush in a table top for examination of large sheets or over a moving web for gloss recording.

For high precision, a digital dial is used in the measurement arm of a null-balance bridge. This digital dial is operated either manually or by servo-motor.

er

er has
ciates
ge Rd,
ntrast
fibers
ations.
ed by
nd as-
nents.
nt to
ests is
g ele-
lected
locks,
r 75°,
e ease
es can
aimed
gloss

ts are
ed by
us be

nt as

speci-
op, or
e and
le top
ets or
ecord-

dial is
of a
al dial
or by

---

ngible
sider-
mption
etting,
rding.
n will
kes no
ng op-